

LINK SUSPENSION SECRETS!

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ON THE COVER: Roving Reporter Harry Wagner was out in front of the pack to catch Shane Doherty's Wrangler flexing over boulders and twisted around rocks. Plus, he was there to catch some towing tips for our giant tow rig section.

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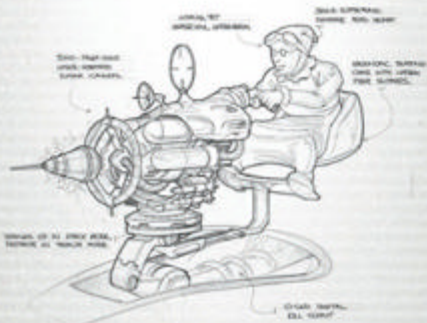
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4XFORWARD



BY 4xFredWilliams


BOINGERS, BOUNCERS, SPRINGERS & LINKERS



AS 4X4 ENTHUSIASTS WE ARE CONSTANTLY discussing suspensions. Better designs for more tire clearance, off-road performance, and vehicle control. How can we keep our center of gravity low but stay up high out of the rocks or mud, while letting big rubber twist and flex over obstacles yet still propel us down the trail and road safely? And don't even start to talk about speed. When we want speed out of our 4x4s it multiplies everything and we start talking about shocks: emulsion, air, coilover, nitrogen-charged, remote-reservoir, bypass ... So many fun shocks to play with! And all designed to help control those springs: coil, leaf, air, and so on.

Suspensions are fun to talk and bench-wheel about, and sure as rain on a wedding day I get the same question all the time: "What is the best suspension for my [fill in the blank]?" I wish I had dollar for every time I heard that questions. (Hmm, I am now charging a dollar for that question!) But the problem is I have not lifted every single make and model 4x4, nor have I used every single brand of suspension component for every single make and model 4x4, so sadly my answer is often pretty boring.

I can tell you that I am a huge fan of a pretty basic suspension design, where the back of the vehicle uses leaf springs (spring over or spring under) and the front uses some sort of link suspension with coils (three-link or four-link with or without a Panhard/track bar). I have found this setup to work pretty well most of the time over a variety of terrain and with a variety of payloads. In fact, it's about perfect for the all-around 4x4s that we usually build for the Ultimate Adventure, and thus has been under at least three that I can think of (Rubiwagon, CJ-17, Tug-Truck). That's probably why I like it, and it's been proven to work well with solid axles under everything from early Broncos to late-model Ford and Ram heavy-duty trucks. No, it's not a perfect race suspension for ultimate performance or for an ultra-twisty rockcrawler, but if you're building something that you want to drive daily and wheel on the weekends, I'd say at least consider the front link, rear leaf recipe. But what do I know?

What also might be amazing to you reader is that most auto owners have no idea about any of the stuff under their vehicle. We the 4x4 fanatics love to dive under a vehicle and see how it works. Noncar people probably have no idea what a coil spring is versus a leaf spring, a shock, or a suspension link. I wonder what those strange beings talk about when they are sitting around the campfire out in the middle of nowhere? 

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CRAWLING CRITTERS

I just read the opening column in the March issue [4xForward, "Trail Dogs"]. It hit home. We put our one dog down this past summer. He was always willing to chase whatever vehicle we were out in the back forty with. He was always nearby when we were out with sleds, quads, and bush buggies. This is a photo of him on the hood of a Samurai my brother brought home one day. Keep up the good work on the magazine. I enjoy reading it.

BRAD JUNGAS

Via email

Thanks, Brad! It's ridiculous how important these four-legged fur balls can be in our lives.

BANZAI!!! OR BONSAI?

Love the magazine, Fred, but given that the caption for photo 13 of your "Teluride to Tuweep" article (Mar. '15) says "from Page, we bonsai-ed to the final destination," don't you think it's rude not to show readers the miniature trees you were working on? It admittedly shows your sensitive naturalist side, but we need to see the results. Of course, there's a chance that you actually *banzai-ed* to Tuweep Overlook. However, given the desperate, fanatical, and suicidal connotations of the banzai charge, that doesn't seem quite right, either. Regardless, thanks for the informative report.

MIKE HISCOX

Portland, OR

Hmm, I'm stumped, Mike. I agree I was in no way planning a suicide run off Tuweep Overlook. So I guess I'm stumped. Like a little tiny miniature tree ... stump.

DON'T HOLD YOUR BREATH

I just got done reading my May '15 mag and I loved it. I know you guys try to hit all areas of the off-road world, which I can appreciate. But when it comes to DED or off-roading road trips, that is right up my alley. Reading the DEDs and stuff like "CA to PA in a CJ" is what really drives me and makes me want to save up some coin and hit the road for a week. Which leads me to my question. In the May '13 4xForward, Rick Péwé talked about a trip through the U.S. and Canada in the flattie he took to Alaska. I've been waiting patiently for this story. So let's print it out; I would love to read it. Also, please pass this on to Mr. Péwé: If he ever feels the need to sell his 1948 CJ-2A (Pete) please call me first. I saw that CJ in your mag on a DED in 2004 and have been in love with it ever since. Thanks for a great magazine.

MATT H.

Via email

The infamous trip to Alaska and back in the flatfender is of epic proportions. I have heard some of the stories from Péwé and his co-drivers, David Freiburger and Ned Bacon, but I doubt anyone will ever read that story. I can only say that if you had to decide between waiting to read this tale or saving up dollars to fix your own Jeep and then driving it to Alaska and back, you would be better to invest in doing the trip yourself. Don't wait on those guys to write the story—go live your own adventure, and maybe we'll run your story!

Oh, and if you want to buy a Péwé flattie you better write his wife and hope she outlives him. Otherwise I'm pretty sure he has a burial plot big enough for himself and his collection.

WHERE'S DED?

When is Fred going to do more *Dirt Every Day* episodes?

SAM SCHRADER

Via email

Really? You like that guy's silly show? Well, we have a whole new season in the works for 2015 and a new title sponsor, 4Wheel Parts. The next airdates we have planned are: May 12, June 9, July 7, July 28, Aug. 18, Sept. 29, Oct. 27, Nov. 24, and Jan. 5. You can watch the show on the *Motor Trend* channel on YouTube (goo.gl/nBtUy). Thanks for watching!



2-WHEEL & OFF-ROAD

I just got the Feb. '15 issue of *Petersen's 4-Wheel & Off-Road*. A question was posed to the readers: Should you cover two-wheel-drive off-road vehicles? I am all for it. Your name is *4-Wheel and Off-Road*, not just *4-Wheel*. I would like to see a prerunner-type build, or why not a competition-type race truck for a Baja or SNORE race? Love the mag. Keep it up!

NICK WALDER

Via email

Thanks for your input. Does it count that both Harry Wagner and Verne Simons have undertaken project trucks that started as 2-wheel-drives? (Both will be getting converted to 4x4 though.)



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DROP STARS OFFROAD





HOT SHOT

WATER WRANGLER

VEHICLE: 2010 Jeep JK **OWNER:** Rocky Knell, Roland, OK **TIRES:** 35x12.5R18 Toyo Open Country's **SUSPENSION:** 2½-inch spacer lift, stock springs and shocks **DRIVETRAIN:** Stock 3.8L V-6, 6-speed manual trans **OTHER DOODADS:** Smittybilt bumper and fender flares, LED spotlight on windshield, LED floodlights on bumper, Ramsey Platinum 9500 winch, quick-disconnect sway bar, Rhino-lined interior, Hi-Lift jack on the hood **FUNNIEST WHEELING INCIDENT:** I bought it on a Thursday and filled it full of water the following Saturday crossing a creek with my wife **DOES EVERYTHING WORK THE WAY YOU WANT?:** Everything works great for an everyday driver and a weekend warrior **ANYTHING YOU WOULD CHANGE?:** 4.56 gears, lockers, 1-ton axles, Vortec V-8 **ANYTHING TO ADD?:** I am a father of five with a factory job and I've never paid anyone to do anything to my Jeep. I learn as I go and always involve my kids. Four of them want a jacked-up 4x4 for their first vehicle—one proud daddy!



JACKED-UP POWERSTROKE

VEHICLE: 1996 F-250 **OWNER:** Colt Colorado Jack, Washington State **TIRES & WHEELS:** 35x12.5R16 Toyo Open Country A/Ts on stock black rims **SUSPENSION:** 4-inch Rough Country lift **DRIVETRAIN:** 7.3L Powerstroke, 5-speed transmission, front Dana 50 axle, rear Dana 60 axle, 4.10 gears **PERFORMANCE MODS:** 120-hp injectors, Garrett turbo housing with Banks guts, Banks oil cooler, 4-inch turbo-back exhaust, K&N air filter **OTHER DOODADS:** Front bumper, canopy, CB whips **DOES EVERYTHING WORK THE WAY YOU WANT?:** So far, yes **ANYTHING YOU WOULD CHANGE?:** 37-inch Nitto Mud Grapplers **ANYTHING TO ADD?:** When in doubt, throttle out



'YOTA KILLER

VEHICLE: 2006 Nissan Titan **OWNER:** Darrel Townsend, Porterville, CA **TIRES & WHEELS:** 35x12.5R17 BFG KM2s on XD Addicts **SUSPENSION:** 2-inch leveling kit, Rough Country UCAs, Bilstein 5100s **DRIVETRAIN:** Stock **PERFORMANCE MODS:** S&B intake, custom cat-back exhaust **OTHER DOODADS:** Legit Accessories LEDs, Glassworks fenders, 2-inch wheel adapters, homebuilt rock sliders and bumper, two 10-inch light bars **FUNNIEST WHEELING INCIDENT:** Showing up Nissan haters everywhere I go and having to hold on before pulling people out so their friends can take photos **DOES EVERYTHING WORK THE WAY YOU WANT?:** Very well for fullsize. Could use more flex and clearance. **ANYTHING YOU WOULD CHANGE?:** Going to boat-side the bed and build custom rear bumper, installing dual-row bar in place of the two single-row bars, long travel kit **ANYTHING TO ADD?:** I need to make Moab soon!



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ROCK-HARD BODY

VEHICLE: 1990 Nissan Hardbody **OWNER:** Jason Dickert, Pueblo West, CO **TIRES & WHEELS:** 33x12.5 BFGoodrich Mud-Terrain T/As on American Racing wheels **SUSPENSION:** 8-inch lift, including front Fox coilovers with Eibach springs, HD torsion bars, custom upper A-arms, Trail Master rear leaves with Fox reservoir shocks **DRIVETRAIN:** 4.88 gears, limited-slips **PERFORMANCE MODS:** KA24E 2.4L I-4, CAI, header, high-flow exhaust, dual 10-inch electric fans **OTHER DOODADS:** Custom aluminum roof rack with two spare tires, Hi-Lift jack, Pro Comp spotlights **FUNNIEST WHEELING INCIDENT:** Behind the Rocks trail in Moab, when my buddy's FC Jeep broke both front and rear driveshafts. I bent both outer tie-rod ends on the same outing. Made the 400-mile trip back to Colorado with a tape-measure alignment and some used tires on the front.



VORTEC WILLYS

VEHICLE: 1947 Willys Jeep **OWNER:** Barry Weckwerth, Boise, ID **TIRES & WHEELS:** 35x12.5R17 General Grabbers on 17x10 rims **SUSPENSION:** 4-inch TJ Rock Krawler long-arm suspension built to a custom frame **Drivetrain:** Chevy 4.3L V-6, 4L60E automatic, NV231C transfer case **DOES EVERYTHING WORK THE WAY YOU WANT?:** So far, wouldn't change anything yet



MT MB

VEHICLE: 1942 Willys MB **OWNER:** Justin Kostecky, Laurel, MT **TIRES:** Old 6.50x16 bias all-terrains **SUSPENSION:** Stock Drivetrain: 100 percent original **PERFORMANCE MODS:** Dry air-element air cleaner **OTHER DOODADS:** Bullet hole in the windshield **DOES EVERYTHING WORK THE WAY YOU WANT?:** Runs great and gets tons of looks! **ANYTHING YOU WOULD CHANGE?:** Full restoration someday, but too much fun right now **FUNNIEST WHEELING INCIDENT:** Took it to a car show, all muddy, and more people were checking out the Jeep than the 1968 Camaro I parked next to **ANYTHING TO ADD?:** I've been inspired by Péwé, Freiburger, and Williams over the years, and I finally got my first Jeep. It has been a ton of fun bringing the old girl back to life.



CHEROKEE GRANDEUR

VEHICLE: 2000 Jeep Grand Cherokee WJ **OWNER:** Dennis Miller II, Leechburg, PA **TIRES & WHEELS:** 315/75R16 Wild Country MTs on 16x8 Pro Comp 7031s, 1.5-inch Spidertrax spacers **SUSPENSION:** Clayton 6-inch long-arm kit with 2-inch Budget Boost, Bilstein 5125 14-inch-travel rears, 11-inch-travel fronts, Pro Comp stem-mount adapters, JKS disconnects, JKS track bar **DRIVETRAIN:** NVG242 transfer case, front Dana 30 axle, rear Ford 9-inch upgraded to 35-spline, Aussie locker, Quick Performance rear truss, Clayton upper 4-link truss and bracket kit, disc brake conversion **PERFORMANCE MODS:** 4.0L I-6, BBK Big Bore throttle body, K&N cold air intake, throttle body spacer, MagnaFlow cat-back exhaust, Borla header, Bosch 4-hole injectors, Superchips FlashPaq tuner **OTHER DOODADS:** Cree 40-inch LED bar, Cree 4x4 LEDs on the A-pillars, Rigid Duallys in the bumper, Prototab bumpers, JRC rock sliders, IRO transfer case skid, Bushwacker cutout flares, Badlands 12,000-pound winch, Viair onboard air system, 60-inch Hi-Lift jack

SUBMISSION INFORMATION

Send us a picture of your ride if you've never done so. We keep a surplus of Readers' Rides submissions, but only one submission per person, and we love all off-road vehicles so send in your entries whether your rig is stock or not. Make sure each digital image is at least 1,600 by 1,200 pixels (or two megapixels) and saved as a TIFF, EPS, or maximum-quality JPEG file. **WRITE TO:** Readers' Rides, 4-Wheel & Off-Road, 831 S. Douglas St., El Segundo, CA 90245 **EMAIL TO:** readersrides@4wheeloffroad.com

- > **VEHICLE** (year, make, model)
- > **OWNER** (name, city, state)
- > **TIRES & WHEELS** (size, make, model)
- > **SUSPENSION** (lift, springs, shocks)
- > **DRIVETRAIN** (tranny, transfer case, axles)
- > **PERFORMANCE** (engine mods)
- > **OTHER MODS**
- > **DOES IT WORK THE WAY YOU WANT?**
- > **ANYTHING YOU WOULD CHANGE?**
- > **FUNNIEST WHEELING INCIDENT**
- > **ANYTHING TO ADD?**

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BY Drew Hardin



TRUCK DEBUTS AT 2015 CHICAGO AUTO SHOW

There was a time when the American automakers would debut their newest cars at the Detroit auto show and then follow that a month later with new truck reveals at the Chicago auto show. This year, though, Detroit hosted several significant truck unveilings—Raptor, Titan, Tacoma—leaving Chicago out in the cold, so to speak. Still, GM and Fiat Chrysler used the event to debut pickups at either end of the price spectrum. And Kia (yes, Kia) showed off an interesting AWD concept that could be a lot of fun.

RAM LARAMIE LIMITED

Ram describes the new top-of-the-line Laramie Limited pickups as “The benchmark in truck opulence.” Inside you’ll find black leather upholstery with contrasting gray piping—including lots of leather on the

doors and instrument panel—real wood trim, knurled chrome rings around the gauges, and Berber carpet floor mats.

Exterior design cues include a newly designed grille; a body-color front fascia with foglamps; a painted rear



bumper (or optional chrome plating on both bumpers); halogen projector headlights; LED marker, turn indicator, and taillights; 20-inch multisurfaced (polished and painted) forged aluminum wheels; and a massive chrome Ram badge

on the tailgate.

The Laramie Limited trim will be available on 1500-series trucks later in the 2015 model year and available on the 2500 and 3500 Heavy Duties in 2016. Pricing details will come closer to their on-sale dates.



KIA TRAIL'STER

It's about time Kia made an off-road version of the Soul crossover. Just a concept at this point, the Trail'ster has a "through the road" hybrid drivetrain consisting of a 185hp turbocharged four-cylinder gas engine powering the front wheels and an electric motor sending 35 hp and 100 lb-ft of torque to the rear wheels. There's no mechanical connection between the two powerplants; the motor engages on an as-needed basis to power the car under light throttle application, assist the gas engine in "acceleration events" like merging onto a freeway, and when the onboard computers sense the front wheels are slipping.

"The benchmark in truck opulence"



To clear off-road obstacles the Trail'ster has been raised 2½ inches over the production Soul's ride height. Pirelli winter tires enhance traction, while KSport coilover shocks damp rough terrain.

Kia didn't say if the Trail'ster would go into production, but there's a good chance the driveline will wind up in future products as a means of enhancing fuel economy.

THIS JUST IN

● "THE ONE ESSENTIAL TOOL you need to never get stuck while driving off-road" was the gotta-see-this headline of a recent story by Motoramic on Yahoo Autos. The story turned out to be a review of the Land Rover LR4, and the "essential tool" was a Warn winch. OK, now you know.

● **SPEAKING OF EXPENSIVE** British SUVs, Rolls-Royce has announced it will build "an all-new, high-bodied Rolls-Royce designed to satisfy the contemporary, highly mobile lifestyles of our discerning clients around the world." Jaguar and Bentley have already announced plans to add SUVs to their product lines, and those should be available by 2016. The on-sale date of the Rolls will be announced "in a few years' time," says a rep.

● **OWNERS OF THE NEW JEEP** Cherokee are still lodging complaints about the way the nine-speed transmission works, says *Automotive News*, so Fiat Chrysler will notify owners about a transmission software reflash available at dealers. The fix applies to those Cherokees fitted with the 2.4L MultiAir2 Tigershark engine, not the V-6.



CHEVROLET SILVERADO CUSTOM

"Back to basics" is the phrase Chevrolet uses to characterize its latest Silverado Custom trim package. Based on the double-cab LS, the package adds 20-inch aluminum wheels and chrome bumpers, mirror caps, and door handles to the truck's exterior. Inside buyers get a 40/20/40 cloth front seat, a tilt steering wheel, cruise control, power windows and door locks, and Chevy MyLink with 4G LTE Wi-Fi. When fitted with the 5.3L EcoTec3 V-8 engine, the Silverado Custom 4x4 has a base price of \$37,800, below the \$40,000 to \$50,000 transaction price most Silverados carry. You can find them now at your Chevy dealers.

TRACK LAYING JUKE!

If the tracked Jeep FC that Daystar brought to the 2014 SEMA Show was too retro for you, how about this snowstorming Juke? A team of Nissan engineers in Finland adapted a Dominator track system to a Juke Nismo RS, reprogrammed the torque-vectoring AWD system, and opened up the front and rear bodywork a bit to clear the treads. Then they bombed around Lapland to test it, hitting more than 50 mph in weather that hit 30 degrees below zero. That's cool.



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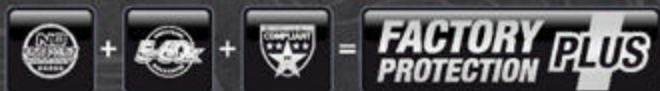
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DRIVELINES

EARTH WATCH

● **THE BLM HAS PUBLISHED A NOTICE** of Intent to conduct an environmental review for the Ocotillo Wells Recreation Area in Southern California's Imperial County. The review will consist of an environmental impact statement to analyze the efficiency and effectiveness of resource and recreation management at the popular State Vehicular Recreation Area and a proposed amendment to the BLM California Desert Conservation Plan. The California State Parks, which manages the SVRA, will jointly prepare an environmental impact report for their General Plan update. Public comments on planning issues, environmental concerns, potential impacts, alternatives, and mitigation measures are being solicited through early April. Comments can be submitted via the BLM's website (blm.gov/ca/st/en/fo/elcentro.html) and by email (blm_ca_ocotillo_wells_ramp@blm.gov).

● **A SIMILAR PLAN ALREADY DRAFTED** by the BLM for the Las Vegas area has raised concerns among the staff of the BlueRibbon Coalition. "As BRC continues to review the draft plan with our legal counsel, legislators, and local users, it is our initial opinion that this proposal, unless modified, will have a significant impact on historic dispersed OHV recreation, the functional elimination of competitive motorized events, and the closure of virtually all OHV use of sand wash-based trails," said BRC. If you're interested in reviewing the plan yourself, it's available on the BRC's website (sharetrails.org), but be forewarned: It's more than 2,000 pages long and tough slogging.

CALENDAR

● **JUNE 3-5:** Off Road Expo and Rock Junction, Grand Junction, CO. Info: gmjc.org

● **JUNE 4-7:** SCORE Baja 500 off-road race, Ensenada, Baja California, Mexico. Info: score-international.com

● **JUNE 5-7:** Razorback Ramble by the Razorback Land Cruisers, Hot Springs ORV Park, Hot Springs, AR. Info: razorbacklandcruisers.com/razorback-ramble

● **JUNE 6:** Getting Started Off-Road Driving Clinic by Badlands Off-Road Adventures, Hungry Valley SVRA, Gorman, CA. Info: 310.374.8047, 4x4training.com

● **JUNE 7:** Getting Started Off-Road Driving Clinic by Badlands Off-Road Adventures, Mojave, CA. Info: 310.374.8047, 4x4training.com

● **JUNE 7:** Speed Energy Formula Off-Road Series Stadium Super Trucks race, Texas. Info: stadiumsupertrucks.com



JEEP FESTIVAL CELEBRATES BANTAM'S 75TH ANNIVERSARY

On June 12-14, 2015, Butler, Pennsylvania, will host the fifth annual Bantam Jeep Heritage Festival, which is expected to draw thousands of Jeep fans for three days of Jeeping events and activities. This year marks the 75th anniversary of the first Bantam Reconnnaissance Car (BRC), which was built by the American Bantam Car Company in Butler. If you're up on your Jeep history, you know the Bantam vehicle was one

of three prototype light reconnaissance vehicles submitted to the government for use in the military. This year's Heritage Festival will have a display of 1940s-era Jeeps, including several from the Omix-ADA collection and the only known recreation of the first BRC. Other events on the docket include trail rides, a mud pit, a show-and-shine, and an attempt at forming the longest Jeep parade in history. Event organizers hope this year's parade will be even bigger than the Festival's 2011 parade, which set a Guinness World Record. For more information on how to get in on the fun, visit bantamjeepfestival.com.

- **JUNE 11-13:** Tillamook Jeep Jamboree, Tillamook, OR. Info: jeepjamboreeusa.com
- **JUNE 12-14:** Bantam Jeep Heritage Festival and 75th Birthday Bash, Butler, PA. Info: bantamjeepfestival.com
- **JUNE 12-14:** Speed Energy Formula Off-Road Series Stadium Super Trucks race, Toronto, Canada. Info: stadiumsupertrucks.com
- **JUNE 13:** Crawlfest Competition, Kansas Rocks Recreation Park, Mapleton, KS. Info: ksrockspark.com
- **JUNE 13:** Winching Clinic by Badlands Off-Road Adventures, Mojave, CA. Info: 310.374.8047, 4x4training.com
- **JUNE 17-20:** Moose on the Loose expedition adventure by Northeast Overland, northern Maine. Info: northeastoverland.forumotion.com
- **JUNE 18-20:** Drummond Island Jeep Jamboree, Drummond Island, MI. Info: jeepjamboreeusa.com

- **JUNE 18-20:** Penn's Woods Jeep Jamboree, Bradford, PA. Info: jeepjamboreeusa.com
- **JUNE 19-21:** Nevada Trophy navigational rally raid by Off-Road Experience, northern Nevada. Info: offroadexperience.com, email wcb@netzero.com
- **JUNE 20:** Getting Started Rock Crawling Clinic by Badlands Off-Road Adventures, Lucerne Valley, CA. Info: 310.374.8047, 4x4training.com
- **JUNE 20-21:** Off-Road Driving School, Iron Range OHV Park, near Minneapolis/St. Paul, MN. Info: ironrangeoffroad.com
- **JUNE 25-27:** Silver Valley Jeep Jamboree, Mullan/Wallace, ID. Info: jeepjamboreeusa.com
- **JUNE 26:** Outdoor Adventure Summer Fest, Frazier Park, CA. Info: 310.374.8047, 4x4training.com
- **JUNE 26-28:** Mud and Crawl by North Idaho Mud and Crawl, Naples, ID. Info: northidahomudandcrawl.blogspot.com

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2011-15 GM 2500HD Level Lift
EXP03161 \$179.99 Available Now!



FORD						
2015 F-150	4WD	6"	Stage 1 Kit w/ ES Shocks	EXP41889	\$1782.99	
09-14 F-150	4WD	6"	Stage 1 Kit w/ ES Shocks	EXP41438	\$1782.99	
11-15 F-250	4WD	6"	Stage 1 Kit w/ ES Shocks	EXP41848	\$1336.99	
11-15 F-250	4WD	6"	Stage 1 Kit w/ ES Shocks	EXP41759	\$1124.99	
11-15 F-350	4WD	6"	Stage 1 Kit w/ ES Shocks	EXP41888	\$1304.99	



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07-15 JK 4-Door 3.5" Lift EXP31008 \$711.99

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07-15 JK 6" w/shocks EXP30888 From \$3558.99
07-08 TJ 4" w/shocks EXP30888 From \$2991.99
*2009-2010 Call for availability

ENTRY LEVEL/BUDGET KITS

07-15 JK 1.75 & 2.5" EXPJ09137 From \$154.99
97-08 TJ 1.5, 1.75, 2" EXPJ09100 From \$40.99
84-01 XJZJ 1.75" EXPJ09100 From \$40.99

LEAF SPRING KITS

53-86 CJ 4" w/shocks EXP3064 From \$791.99
53-86 CJ 2.5" w/shocks EXP3063 From \$558.99

SHORT ARM/STANDARD KITS

07-15 JK 4" w/shocks EXP30698 From \$661.99
97-08 TJ 4" w/shocks EXP30785 From \$672.99
84-01 XJZJ 4" w/shocks EXP30698 From \$795.99

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1500	14-15	4WD	6"	Knuclie Kit w/ ES Shocks	EXP11548	\$1683.99
1500	07-13	2/4WD	6"	Stage 1 Kit w/ ES Shocks	EXP11438	\$1682.99
1500 Pickup	99-07	4WD	6"	Kit w/ ES Shocks	EXP10578	\$1662.99
2500 Pickup	11-15	2/4WD	6"	Knuclie Kit w/ ES Shocks	EXP10858	\$1807.99
3500 Pickup	11-15	2/4WD	6"	Knuclie Kit w/ ES Shocks	EXP10878	\$1954.99
Tahoe	2015	2/4WD	6"	Stage 1 Kit w/ ES Shocks	EXP11608	\$1904.99

DODGE RAM

3500	13-14	4WD	6"	Stage II w/ES	EXP30888	\$1571.99
2500/3500	09-13	4WD	6"	System w/ ES	EXP30818	\$1233.99
1500	2015	4WD	6"	Stage 1 Kit w/ ES	EXP21018	\$1868.99
1500	12-14	4WD	6"	Stage 1 Kit w/ ES	EXP30828	\$1648.99
1500	09-11	4WD	6"	Stage 1 Kit w/ ES	EXP30758	\$1648.99

TOYOTA

Tundra	07-15	2/4WD	7"	Stage 1 Kit w/ ES	EXP30858	\$1828.99
Tundra	07-14	2/4WD	6"	Stage 1 Kit w/ ES	EXP30898	\$1874.99
Tundra	07-14	2/4WD	6"	Stage 1 Kit w/ ES	EXP30798	\$1727.99
Tacoma w/VSC	05-13	2/4WD	6"	Stage 1 Kit w/ ES	EXP30738	\$1608.99

* Additional Products and Applications Available. Call or See Website for Current Pricing and Specials. *

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F150	2015	4"	RANR65009	\$1542	
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F-250/350 SD	05-07	2.5"	RANR65108	\$550	
F-350 SD 4WD	11-14	4"	RANR65248	\$920	
F-350 SD 4WD	11-14	2.5"	RANR65258	\$939	
Chevy/GM					
Tahoe/Yukon XL	07-13	4"	RANR65828	\$2120	
Silverado	2014	4"	RANR65318	\$1732	
Silverado	2013	4"	RANR65308	\$1701	
2500HD	11-15	4"	RANR65548	\$2250	
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07-15 JK 4DR	4.5"	RE7144	\$1859.99

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07-15 JK 2DR	2.5" Kit w/ Shock Extension	RE71336	\$439.99

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07-15 JK 2DR	4.5"	RE7354	\$2299.99
07-15 JK 4DR	3.5"	RE7363	\$2099.99
07-15 JK 4DR	4.5"	RE7364	\$2299.99

Economy Kits

07-15 JK 2DR	2"	RE7300	From \$299.99
07-15 JK 4DR	2"	RE7301	From \$299.99

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07-15 JK 2DR	3.5", 4.5", 5.5"	RE7003	From \$919.99
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09-13 Ram 2500 (Diesel)	4WD	4.5"	FABK3037	\$1267.94
09-12 Ram 3500 (Diesel)	4WD	4.5"	FABK3037	\$1267.94
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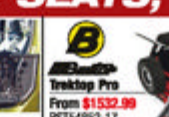


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Application	Height	Description	Part #	Price
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14-15 Silverado/Sierra 1500 2WD/4WD	2"	Front & Rear Leveling Kit	DAYKG09138BK	\$218.99
07-13 Silverado/Sierra 1500 2WD/4WD	2"	Front & Rear Leveling Kit	DAYKG09118BK	\$218.99
11-15 Silverado/Sierra 2500 2WD/4WD	2"	Front Leveling Kit	DAYKG09123	\$129.99
99-10 Silverado/Sierra 2500 2WD/4WD	2"	Front Leveling Kit	DAYKG09107	\$129.99
14-15 Tahoe/Suburban/Yukon 2WD/4WD	2"	Front Leveling Kit	DAYKG09134BK	\$129.99
Ford				
10-14 F-150 Raptor 4WD	2"	Front Leveling Kit	DAYKF09129BK	\$129.99
09-15 F-150 2WD/4WD	2"	Front Leveling Kit	DAYKF09124BK	\$129.99
05-15 F-250/F-350/F-450/F-550 4WD	2.5"	Front Leveling Kit	DAYKF09119BK	\$129.99
99-15 F-250/F-350/F-450/F-550 2WD	2"	Front Leveling Kit	DAYKF09101BK	\$129.99
Dodge				
09-15 Ram 1500 4WD	2"	Front Leveling Kit	DAYKC09113BK	\$129.99
09-15 Ram 1500 4WD	2"	Front & Rear Leveling Kit	DAYKC09114BK	\$159.99
94-13 Ram 2500/3500 4WD	2"	Front & Rear Leveling Kit	DAYKC09122BK	\$218.99
13-15 Ram 2500/3500 4WD	2"	Front Leveling Kit w/Shocks	DAYKC09138BK	\$239.99
14-15 Ram 3500 2WD	2"	Front Leveling Kit	DAYKC09134BK	\$159.99
Toyota				
05-15 Tacoma 2WD/4WD	2.5"	Front Leveling Kit	DAYKT09116BK	\$129.99
07-15 Tundra 2WD/4WD	3"	Front Leveling Kit	DAYKT09125BK	\$129.99
10-13 4 Runner 2WD/4WD	2.5"	Front Leveling Kit	DAYKT09133BK	\$129.99
07-14 FJ Cruiser 2WD/4WD	2.5"	Front Leveling Kit	DAYKT09124BK	\$159.99
07-14 Sequoia 2WD/4WD	3"	Front Leveling Kit	DAYKT09125BK	\$129.99
Jeep				
07-15 JK 2WD/4WD	1.75"	Front & Rear Leveling Kit	DAYKJ09137BK	\$159.99
07-15 JK 2WD/4WD	3"	Front & Rear Kit w/ Shocks	DAYKJ09153BK	\$399.99
97-06 TJ 2WD/4WD	1.75"	Front & Rear Leveling Kit	DAYKJ09103BK	\$129.99
97-06 TJ 2WD/4WD	2.75"	Front & Rear Kit w/ Shocks	DAYKJ09160BK	\$459.99
84-06 TJ/XJ/ZJ 2WD/4WD	1.75"	Leveling Kit (Pair)	DAYKJ09100BK	\$39.99
84-01 XJ Cherokee 2WD/4WD	1.75"	Front & Rear Leveling Kit	DAYKJ09105BK	\$159.99



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Application	Description	Part #	Price
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07-16 Jeep JK	Hood Cowl Kit	DAYKJ71050BK	\$329.99
95-06 Jeep YJ / TJ	Hood Vents	DAYKJ71042BK	\$79.99



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DAYKJ71048BK

Hood Wranglers

Application	Description	Part #	Price
07-16 Jeep JK	Hood Wrangler	DAYKJ09146BK	\$24.99
97-06 Jeep TJ	Hood Wrangler	DAYKJ09146BK	\$24.99

Dash and Switch Panels

Application	Description	Part #	Price
11-15 Jeep JK	Dash Panel with GPS/Phone Cradle	DAYKJ71047BK	\$35.99
07-10 Jeep JK	Dash Panel with GPS/Phone Cradle	DAYKJ71020	\$24.99
07-10 Jeep JK	Switch Panel	DAYKJ71030	\$19.99
07-10 Jeep JK	A-Pillar Switch Pod w/ switches	DAYKJ71044BK	\$89.99

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P245/75R16	BF602346	\$132.99	P275/65R20	BF628341	\$182.99
P255/70R16	BF607509	\$136.99	P275/60R20	BF642653	\$191.99
P265/70R16	BF609876	\$167.99	31X10.50R15	BF607405	\$148.99
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P245/65R17	BF608455	\$151.99	L245/75R16	BF617197	\$172.99
P245/70R17	BF639741	\$149.99	L265/75R16	BF621328	\$177.99
P255/70R17	BF609658	\$166.99	L265/75R16	BF631608	\$197.99
P265/65R17	BF639131	\$150.99	L275/60R17	BF610679	\$197.99
P265/70R17	BF622049	\$148.99	L285/70R17	BF655942	\$222.99
P285/70R17	BF625471	\$187.99	L275/65R20	BF639781	\$251.99
P255/70R18	BF627505	\$181.99			



All Terrain T/A KO

Tire Size	Part #	Price	Tire Size	Part #	Price
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235/75R15	29274	\$139.99	295/75R16	92042	\$231.99
30x9.50R15	16177	\$152.99	371/12.50R17	12411	\$364.99
33x10.50R15	63540	\$164.99	265/70R17	12665	\$238.99
33x12.50R15	09681	\$173.99	265/70R17	37130	\$234.99
33x12.50R15	49774	\$186.99	305/65R17	00675	\$276.99
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255/70R16	78762	\$202.99			

Mud Terrain KM2

Tire Size	Part #	Price	Tire Size	Part #	Price
235/75R15	BF658572	\$183.99	371/12.50R17D	BF609782	\$407.99
30x9.50R15	BF615976	\$175.99	L305/60R16E	BF631489	\$388.99
33x11.50R15	BF611079	\$203.99	35x12.50R16D	BF628459	\$421.99
33x12.50R15	BF645736	\$214.99	371/12.50R16D	BF607218	\$350.99
235/70R16	BF612670	\$183.99	L305/65R20E	BF620881	\$331.99
245/75R16	BF615290	\$238.99	L325/60R20D	BF634143	\$584.99
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7031 Flat Black		7068 Flat Black		104 Black Machined		109 Pila		111 Cleanline		107 Machined	
17x9 \$171.99	17x9 \$171.99	17x9 \$171.99	17x9 \$171.99	17x9 \$171.99	17x9 \$171.99	17x9 \$171.99	17x9 \$171.99	17x9 \$171.99	17x9 \$171.99	17x9 \$171.99	17x9 \$171.99

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TIPS FOR TOWING YOUR RIG TO THE TRAIL



GET THERE IN ONE PIECE

By Harry Wagner
PHOTOGRAPHY BRIAN SUMNER
AND HARRY WAGNER

THEY SAY THAT GETTING THERE is half the fun, but if you end up in a ditch you probably are not having much fun. That is why it is important to tow your rig safely to the trail. Breaking at slow speeds when you're rockcrawling or in the local mud pit is expected, but you don't want to be on the side of the road with your tow rig or trailer broken down. Trust us—we know from experience. The upside is that you can learn from our mistakes instead of repeating them. That means more time wheeling and less time whining.

1 We prefer to have one person hook up the trailer to the truck. While it may seem quicker to have someone help, splitting the job raises the possibility that something gets overlooked. We have left the foot on the jack down when we thought someone else was securing it, only to have the jack tear off the trailer when we left the driveway. Not a good way to start your trip.



1



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2



6



8



3



9



4



7



5

2 Trailers take specific tires that are typically bias-ply construction and are made to withstand the unique loads that trailers are subjected to. They are not the same as passenger or light truck tires.

3 Trailer tires spend the bulk of their life sitting, so they often dry rot or become unusable long before they wear out. Covering your tires, and even lifting them off the ground, is a low-cost investment that will help your tires last much longer.

4 If you have full-width axles, adding box tubing inside the fenders will allow you to drive over them without bending the fenders. There is no need to replace the entire fender. An alternative we have seen used is railroad ties or other sturdy wood that is cut to match the profile of the fenders.

5 This is what can happen if you drive over your fenders without reinforcing them. The fender bent into this tire. Fortunately it was caught before a blowout, but it still had to be replaced when it was discovered.

6 Note how we did not place the straps over the brake lines and risk kinking them. We also attached the straps to the axles and not the chassis, allowing the suspension to function on the vehicle being towed. If you attach straps to the chassis, you risk them coming loose or breaking as the suspension cycles.

7 Wood decks tend to be less expensive than metal decks and are much quieter when loading and unloading, particularly when using chains and binders. They do require more maintenance than metal decks though, and you cannot weld attachment points to the deck of the trailer.

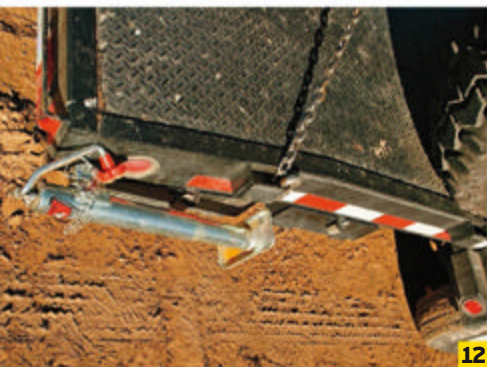
8 Chains are less prone to being cut than straps, and graded chain can be stronger than straps. But chains and binders can be more expensive than straps and more difficult to get in the precise length you need. Some people use a chain on the rear of the trailered vehicle and then tighten the load down with a strap on the front for a balance between convenience and strength.



10



11




12

9 These straps were affixed in a cross pattern to stabilize the vehicle both lengthwise and side to side. Typically we will cross the straps at one end of the trailer and run them straight from the trailer to the vehicle on the other end.

10 We prefer D-rings to stake pockets when using straps, as they allow the hook to completely seat and the latch to close. Stake pockets have bent and damaged the latch mechanisms on our straps in the past. The D-rings are inexpensive and easy to add around the perimeter of your trailer.

11 When you stop for fuel check that the straps are still tight. When the strap is tightened the handle must be closed in order for the latch mechanism to be secured. Wrapping the excess strap over the handle adds even more security.

12 Additional jacks at the rear of your trailer are useful to load or unload a vehicle without the trailer hooked up to a tow rig, and they can also be used to keep the trailer tires off the ground when the trailer is not in use or you need to service the axles. 

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PROPER WAYS TO STRAP A TRUCK TO A TRAILER

TIED TIGHT

By Fred Williams
PHOTOGRAPHY FRED WILLIAMS

TOWING YOUR TRAIL RIG TO the dirt is something many of us do so we can drive like total idiots off-road and still get home when we have broken our junk. However, this idiotic driving fun comes with responsibility—namely, strapping your 4x4 down safely to the trailer for the drive to and from the trail. We have all seen countless vehicles on trailers with no shortage of lousy strap-jobs. And sure, the tow-rig driver may be fine with his lack of safety, but what happens when something goes wrong? What if you have to punch the brakes and quick as a flash your wheeler has snapped a

cheap tie-down and comes leaping into the bed of your tow rig? We've seen it happen. Or what if a maneuver to dodge highway debris sends your prized wheeling machine tumbling off your trailer because you were too lazy to tie it down right? If you're lucky you'll get off with a smashed-to-smithereens trail rig. If you're unlucky your big-tired crawler will end up crushing a minivan carrying a family that happens to be the cousin of a powerful senator who will then push for legislation against big-tired crawlers and close down all our trails! Thanks, you lazy bum. You ruined it for everyone!

The fact is you should be diligent to tie down your ride with quality straps and with redundancy so if one should fail you have a backup strap or two for holding that beautiful rock-scarred atrocity you

1 If you have the money to buy a trailer and a tow rig, to own a vehicle that gets towed, and to fill two vehicles with fuel for a trip to the trail, then we bet you have the money to buy good straps. Call up Mac's Custom Tie-Downs. They can set you up with a value pack for under \$150 and a top-of-the-line set of four ratchets and axle straps for around \$255. That's cheap insurance against your ride falling off and killing someone. Each strap can hold 10,000 pounds, but don't be dumb and use only one; use all four.

love to drive off-road like an idiot. You are a representative of our sport because it's hard to hide how much fun wheeling is when nonwheelers see such a magnificent tube machine on your trailer as you roll down the highway. Those fancy shocks and big tires are just feeding the envy of other drivers. So do your part. Tow safe, strap down well, stop and check those straps regularly, and have fun.

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2



3



5



6



4



7

“What if an evasive maneuver sends your prized wheeling machine tumbling off your trailer?”

2 Before we go any further, when you put your 4x4 on the trailer, put it in low range, hubs locked (if you have hubs), either in gear or park, and set the parking brake. This is good insurance that it won't move. But again, don't be dumb. You still need to strap it down.

3 We tie all our vehicles down by the axle tube, the lower A-arm, or a lower suspension link, but the best bet is throwing an axle strap around the axle tube. Put the straps over smooth metal. Attaching the straps to the frame or to bumper recovery points is not a good idea because the 4x4's suspension can compress and rebound as the trailer goes down the road, in effect loosening the straps. This can shorten the life of the straps, break the straps, or cause them to come unhooked if they do not have hook enclosures.

4 There is a longstanding debate about whether you should cross your tie-down straps or run them straight. We always used to run the front's straight and the rears crossed,

but Mac's standpoint is to run them all straight. If you run them crossed and one strap fails or comes loose, the vehicle will have a tendency to move sideways. If the straps are all straight and you lose a strap, the other three will still work to hold the vehicle in place.

5 Some people cross their straps because their 4x4 is too long and trailer too short and their straps are long when combined with axle straps. A better option is to get a set of Mac's Cinch Pack straps. These combine the axle strap and ratchet strap into one piece that goes around the axle and then cinches tight. Using the ratchet with its built-in hook reduces the overall length from hook to axle tube.

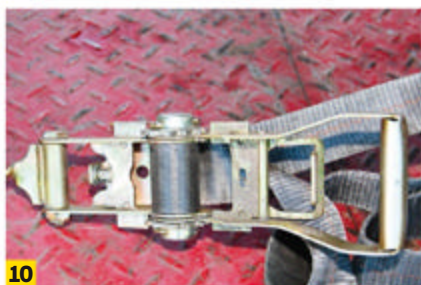
6 Trailers with side-mounted stake pockets are a pain in the butt to hook tie-down straps to. Plus, they don't run the straps straight but rather at an angle from the axle tube around the tire to the outside stake pockets. If you are stuck with a stake pocket trailer you need a set of straps with chain extensions

so that the chain can attach to the stake pockets. We'd rather see properly installed tie-down points on the trailer deck.

7 No matter how you attach the straps to your vehicle, the goal is to have the reinforced axle straps run over smooth metal. We have attached axle straps around lower links and pulled them tight against the axle mounts, but the mounts are never round and smooth. They're usually straight and sharp and can reduce the life of an axle strap immensely.

8 Looping an axle strap around a lower A-arm on an independent suspension isn't bad, but again, feel around the arm for sharp metal that could cut or otherwise damage your axle straps. Some cast or fabricated arms have sharp edges on the inside.

9 When routing the axle straps around your axle tubes, watch for brake lines and speed sensor wires. It's better to run under these than over, as they can get pinched or broken. It is even



possible to route your axle strap through the lower portion of your steering C as a tie-down point.

10 When tightening up your ratchet strap, give it about two or three wraps on the ratchet drum before you get it tight. This added friction around the drum helps retain the tightening, where a single wrap can work loose.

11 There are many ways to tie up your loose, unused ends of the ratchet strap. Mac's offers these trick little Velcro straps, but you can also use a small bungee, or run it under the ratchet handle as long as you can ensure that it goes into the locked position. Don't let your straps drag. They'll get frayed, you'll ruin your investment in straps, and you may get dirty looks from the locals or lawmen. ☹

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By Fred Williams**PHOTOGRAPHY** IMAGO TRAILER

W E ALL KNOW THAT fixing up your 4x4 to stronger parts can allow you not only to run bigger tires but also do more work with your vehicle, but did you know that it's possible to do the same thing with your trailer? How many of you have nice trailer that you think is perfect for hauling your 4x4 to the desert, but by the time you are all loaded up with trail rig, spare parts, camping gear, tools, and so on, you are over the safe cargo limit of the trailer? Our friends at a local 4x4 shop were in just that predicament. To make matters worse, they had a big lifted truck that they wanted

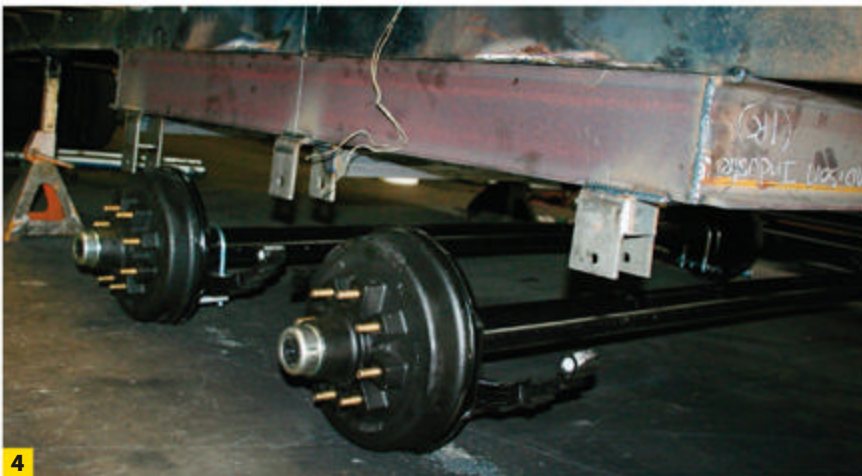
to tow with, requiring a massive drop hitch.

Most boxed/flatbed trailers equipped with a six-lug axle and a 15-inch wheel/tire combo are rated at between 3,500 and 6,000 pounds per axle, so that is 7,000 to 12,000 total pounds of load hauling ability, including the weight of the trailer. And just like larger truck axles, an eight-lug trailer axle is usually rated at 5,200 to 7,000 per axle so somewhere between 10K and 14K gross weight. The trailer that our friends were using was only equipped with the smallest 3,500-pound rated axles. After much use and abuse by hauling heavy loads, the poor trailer was succumbing to the weight. The options were replace the trailer or upgrade. They chose to take it to Imago trailers in Colton, California, for an upgrade to beefier 7,000-pound rated eight-lug axles.



EIGHT-LUG TRAILER AXLE UPGRADES FOR BIGGER TIRES & MORE WEIGHT TONS & A LIFT FOR





R YOUR TRAILER?




“When you carry more than a trailer’s capacity, it results in premature wear”

1 When you carry more weight than a trailer’s capacity, it results in premature wear and possible failures. The most common failures are uneven tire wear, tire sidewall damage, and bent or broken axles and spindles. The best advice is to not get in this mess in the first place by buying a trailer with the correct capacity for what you haul, but it is possible to upgrade the axles and suspension for heavier cargo—to a point. In the case of this 26-foot box trailer, it had been upgraded with interior cabinets, extra tools, and spare parts for a big trail Jeep that runs tons and 42-inch tires. The poor little six-lug axles and 15-inch tires were not surviving.

2 The first step in upgrading is removing the small stuff. The crew at Imago Trailer took torch to the torsion axles because they don’t just bolt to the trail chassis. The torsion axles are not a bad option, but they can be limited in the amount of repairs possible short of replacing them completely. The consensus was that swapping over to a set of leaf-sprung axles would gain us 4 inches of height and better weight distribution over a similarly rated torsion axle.

3 Gaining height may seem counterintuitive for a trailer. Why raise your cargo even higher from

the ground? But in fact it opens up three positives for this particular trailer. First, the trailer can now run a bigger G-rated 235/85R16 tire, up from the prior C-rated 225/75R15 2540. Second, these tires can hold more weight. Third, these tires are taller, which isn’t a bad idea for a trailer that gets drug down rutted dirt roads where it would often bottom out and get banged into the ground.

4 In order to clear the bigger tires, the leaf springs needed additional help. A 4-inch subframe was added between the springs and the trailer chassis—a body lift of sorts. This brought the trailer up enough to clear the bigger tires from stuffing into the body/fenders of the trailer and, as an added benefit, meant that the giant tow rig no longer needed a big drop hitch to hook up to the trailer because it now rode higher. The leaf-spring design of the new suspension uses an equalizer bar between them to help distribute the load more evenly over both axles—another bonus. 

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PACK OF 50

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61837

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• Weighs 245 lbs.

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60395/62325/62493

Item 60807 shown

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Item 61523 shown

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• 300 lb. Capacity
LOT NO. 69262
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THE HITCHIN' POST

EVERYTHING YOU NEED TO TOW SAFELY

By Harry Wagner

PHOTOGRAPHY COURTESY OF THE
MANUFACTURERS AND HARRY WAGNER

HEAVY-DUTY TRUCKS HAVE come a long way in the last decade, with horsepower and tow ratings increasing every year. Just because your new truck is rated to tow 28,000 pounds though doesn't mean that you have everything necessary to get the job done. And if you have an older truck that didn't come from the factory with a brake controller or backup camera, you still have the option of adding those components, and more, via the aftermarket. We rounded up some of the best towing products on the market so that you can go a long way too, just like those fancy new trucks.

1

MAC'S ULTRA PACK

The Ultra Pack features separate axle straps and ratchet straps in your choice of black, blue, red, or yellow. The pack comes in 6- and 8-foot options and can be ordered with a twisted snap hook, a direct hook ratchet, or a chain extension to meet whatever the situation requires. Mac's straps have more than twice the number of stitches than most competitors' straps, giving it a 10,000-pound capacity rating. **INFORMATION:** Mac's Tie Downs, 800.666.1586, macstiedowns.com.



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10th Anniversary Wrangler Rubicon
By Christian Cooper From the March, 2012 issue of Jp



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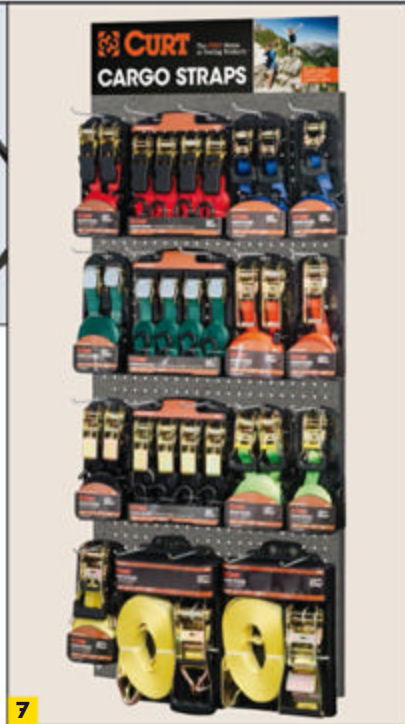
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2 CURT TRIFLEX BRAKE CONTROL

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3 HUSKY CENTER LINE TS

The TS hitch from Husky has weight distribution with built-in sway control, is easy to install, and even comes with hitch ball already installed. This system employs a combination of steel types, trunion bolts, head plate design, and clamping forces to produce over 1,800 pounds of very quiet sway resistance. A smooth ride is achieved through precisely engineered tapered spring bars. **INFORMATION:** Husky Towing Products, 877.544.4449, huskytow.com.

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5 REESE DROP-IN HITCH

This new fifth wheel hitch fits Ram 2500 HD and 3500 HD trucks with the OE tow package (factory-installed OE rail system). Rated for 20,000 pounds of capacity with a 5,000-pound pin weight capacity and featuring the Reese Elite Series fifth wheel head, this new hitch has a black powder-coat finish, is SAE J2638 Compliant, and has a limited lifetime warranty. **INFORMATION:** Reese, 800.632.3290, reeseprod.com.

6 WESBAR AUXILIARY LED WORK LIGHT

Wesbar helps light up your workspace with auxiliary LED work lights. Available in round or rectangular, the lights have a 12-volt power adapter or can be hardwired directly to your vehicle. The portable lights come with a 19-foot extended coiled cord and a magnetic base with protective film

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7 CURT CARGO STRAPS

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THE HITCHIN' POST



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8 HIDDEN HITCH CLASS III/IV MULTI-FIT

Utilizing solid all-welded construction, these Class III/IV Multi-Fit hitches by Hidden Hitch ensure a perfect fit. They offer top towing performance, which allows the tow vehicle to withstand road abuse within specified capacities. Rated up to 6,000 pounds GTW weight carrying and 10,000 pounds GTW weight distribution, this receiver features an A-coat base with a black powdercoat finish and a lifetime limited warranty. **INFORMATION:** Hidden Hitch, 800.632.3290, hiddenhitch.com.

9 TEKONSHA PRODIGY P2 BRAKE CONTROLLER

This brake controller works with electric over hydraulic brake systems and is designed with reverse battery protection for both vehicle and breakaway. Numerous mounting options, digital display, self-adjusting, quick disconnect, and continual diagnostic checks are just some of the useful features found on the Tekonsha Prodigy P2. The innovative Boost feature allows users to apply more initial trailer braking power when towing heavier trailers. **INFORMATION:** Tekonsha, 800.632.3290, tekonsha.com.

10 HUSKY FOLDING TOW BAR

Flat towing is a great option if you don't



11



12



13

have a trailer. This folding tow bar from Husky is lightweight and easy to install and features a 5,000-pound capacity and adjustable arms. It easily connects and disconnects from the bumper mounting brackets by two pull pins and folds for compact storage. The quick-latch coupler fits 2-inch trailer balls. **INFORMATION:** Husky Towing Products, 877.544.4449, huskytow.com.

11 PRO SERIES ADJUSTABLE BALL MOUNTS

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12 HUSKY ASCEND BRAKE CONTROLLER

The Husky Ascend brake control features three separate components so you can mount them where they work best for you. The display can be mounted on the A-pillar, dash, or rearview mirror. The manual control can be placed within easy reach. The brain mounts out of sight. All



14

three components plug in together for the ultimate in flexibility and safety. Advanced proportional technology can control up to eight brakes and mirrors the braking of the tow vehicle. **INFORMATION:** Husky Towing Products, 877.544.4449, huskytow.com.

15 **DRAW-TITE PRO SERIES PINTLE COMBO**

This pintle hitch from Draw-Tite is a great choice for towing off-road. It comes with a pintle hook with a 2⁵/₁₆-inch ball hook rated at 16,000 pounds, a ball rating of 14,000 pounds, and a 3,000-pound maximum vertical load. Black powdercoat, Grade 8 hardware, and a limited lifetime warranty complete the package. **INFORMATION:** Draw-Tite, 800.632.3290, draw-tite.com.

16 **HUSKY BRUTE POWER JACK 4500**

The rugged Husky Brute 4500 Power Jack lifts up to 4,500 pounds with gear reduction for fast travel speeds. The jack includes a 6-inch adjustable dropdown leg. The 2¹/₄-inch main tube fits most A-frame couplers. Features include a ball screw design for smoother operation and longer motor life, SmartStop technology that controls the jack's range, and three LED lights to illuminate the hitch area. **INFORMATION:** Husky Towing Products, 877.544.4449, huskytow.com. 

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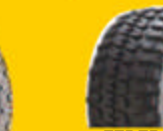
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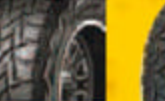
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>DRIVETRAIN

ENGINE: 3.8L V-6

TRANSMISSION: 42RLE 4-speed automatic

TRANSFER CASE: Advance Adapters Atlas II

FRONT AXLE: Currie Rock Jock 60 with 5.13 gears and ARB Air Locker

REAR AXLE: Currie Rock Jock 60 with 5.13 gears and ARB Air Locker

>SUSPENSION

SPRINGS & SUCH: Trent Fabrication long arm with King air bumps and front Fox coilovers and rear Synergy lift springs

TIRES & WHEELS: 40x13.5R17LT Maxxis Trepador radials on 17x9.5 Raceline Monster beadlocks

STEERING: PSC hydraulic assist

OTHER STUFF: Poison Spyder front bumper, Rigid Industries LED light, Warn XD9500i winch, Masterpull synthetic winch line, Shrockworks rock sliders, Shrockworks rear bumper and tire carrier, Synergy Mfg. skidplates, Bayshore 1350 drivelines, AEV snorkel, Optima RedTop battery, York air compressor, sPOD switch panel, Xenon fender flares



BUY LOW

THIS JK IS NO MALL CRAWLER

by Harry Wagner

PHOTOGRAPHY HARRY WAGNER

STEVE CASCI IS ONE OF THOSE guys who change rigs more often than most of us change socks. He is constantly selling old projects to make room for something new. After his 2009 JK Unlimited sat dormant for eight months while Steve was out enjoying trails in a Polaris RZR, he decided to unload the Jeep. Shane Doherty snatched up the 5-year-old JK with less than 9,000 miles on the odometer for a bargain.

Shane has his own project, a CJ-7 that he is restoring, but the four-door JK is ready to wheel right now and has more room for Shane's son and other passengers. Plus, Casci had already put the first (and second, and third...) scratch in the Jeep, so Shane can wheel it hard without worrying about putting the first dent in his new (to him) Wrangler. On the contrary, the hard work has been done and the money spent, and now Shane can just enjoy the ride. ☺

1 After bending the factory axles, they were replaced with Currie Rock Jock Dana 60s with 5.13 gears, ARB Air Lockers, and eight-lug F-450 outers. The axles are located by a custom long-arm suspension fabricated by Trent Fabrication with radius arms in the front and a three-link configuration in back.

2 The interior is largely stock, with the addition of a Yaesu 8800 2m radio and Cobra CB, with the mics for both secured to the Tuffy Flip-N-Lock Tray. Toggles for the air compressor and ARB Air Lockers are located under the HVAC controls and in front of the twin shifters for the Atlas II transfer case, where they are easy to reach yet not likely to be accidentally bumped.

3 Well-worn Synergy skidplates protect the automatic transmission that was upgraded with a Rock Krawler deep sump pan and the Advance Adapters Atlas II transfer case. The ability to just engage the front axle (front dig) with the Atlas II is useful on tight trails where the longer wheelbase of the four-door JK is a disadvantage.

4 Got that out of the way! This Jeep had body damage before it had even had its first oil

change. That makes it easier to tackle tough trails where the 40-inch tires and Currie axles are required.

5 The front suspension uses 12-inch-travel Fox coilovers and Eibach dual-rate springs, while the rear retains coil springs from Synergy Manufacturing since coilovers would either have to be mounted through the tub or hang down below the centerline of the axle. Both ends use King hydraulic bumpstops and Synergy limit straps to control the suspension travel.

6 The 3.8L V-6 has less than 10,000 miles on it, so it hasn't given Shane any reason to change it. The engine breathes through an AEV snorkel and is equipped with a York belt-driven air compressor, dual Optima RedTop batteries, and a sPOD power distribution block.

7 The rear taillights were replaced with housings from Warrior Products that hold common round LED lights and are far less susceptible to damage than the stock taillights. Also visible are the side markers to stay legal and the air hose fitting for the onboard air next to the Shrockworks rear bumper.



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By Harry Wagner
PHOTOGRAPHY HARRY WAGNER

YOU DON'T OFTEN READ about this in magazines, but the truth is that lifting your 4-wheel vehicle can be like opening Pandora's Box. First you install the lift, but that is just the beginning. Next you add larger tires. Wasn't that the whole point of lifting the truck in the first place? Then you need to purchase lower gears to turn your bigger tires. As long as you are inside the axles, it is a good time to add a locking differential...

If you have planned for all of these events, you will not be disappointed in the capabilities of your vehicle when you are done. If you are on a limited budget though, it may be more prudent to install a modest suspension lift and slightly larger tires because they are not only less expensive than larger tires but do not require new axle gears.

No one is on a more limited budget than a high school kid, so when Wyatt's dad offered to buy him a Skyjacker suspension for his Tacoma if Wyatt got As and Bs on his report card, he had to explain that the budget for the modifications was not endless. Welcome to adulthood, Wyatt.

When discussing moderate lift heights, Skyjacker might not be the first name to come to mind. While it is true that the company makes lifts up to 8 inches tall for a variety of applications, that is not all they offer. Skyjacker has been in business for over 40 years and has a variety of suspension heights and options available for nearly every 4x4 on the market, including Wyatt's Tacoma. Adding a 2-inch lift to the truck allowed fitment of 235/85R16 General Grabber AT2s.

The stock suspension on the Toyota was shot, so adding inexpensive spacers above the factory struts was not an option. Instead, Skyjacker's replacement struts were used with the stock coils in the front to retain the factory ride quality. Tacoma's are notorious for breaking leaf springs, so although Skyjacker offers an add-a-leaf, Wyatt's truck was upgraded with full replacement leaf springs and Skyjacker M95 monotube shocks. These were not the least expensive options, but knowing that there would be no additional costs in the future made it easier to invest in the high-quality Skyjacker suspension.

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1

1 Motivation can come in many forms. Wyatt's father made a promise to buy him this Skyjacker suspension if he could maintain a 3.5 grade point average. New shocks for a good report card is a fair trade.

2 Since the lift height offered by the Skyjacker suspension is modest, there is no need for new steering knuckles, drop crossmembers, extended brake lines, or sway bar extensions. This allows Skyjacker to offer high-quality shocks and springs at an affordable price.

3 The Skyjacker S8000 front strut has an adjustable spring seat to offer anywhere

from 1 to 3 inches of lift. Skyjacker does not recommend running more than 2 inches of lift unless your Tacoma is equipped with manual locking hubs, where the CV axles are not spinning unless the hubs are locked.

4 Comparing the body of the factory strut to the new strut, it is easy to see where the added lift height comes from. The Skyjacker S8000 uses a 14mm chrome hardened shaft and a 150-psi, twin-tube, gas-charged design for a firm yet controlled ride.

5 A spring compressor is necessary to remove the factory spring from the stock strut and install it on the Skyjacker strut. Spring compressors can generally be rented from your local parts store for free.

6 The stock front struts were easy to remove from the Tacoma, while the longer Skyjacker struts were more challenging to install (well, challenging for Wyatt while his dad and granddad coached from the couch). The lower ball joint was unbolted from the knuckle to create the necessary space to install the S8000 strut.

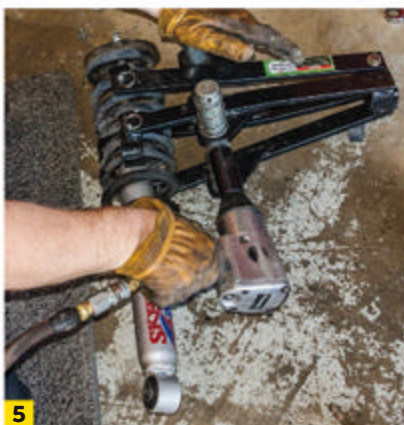
7 Yes, Wyatt got off easy with a two-post lift to install his new Skyjacker suspension. The rear suspension consists of leaf springs though and could easily be performed with jackstands in the driveway if you don't mind lying on your back.



2



3



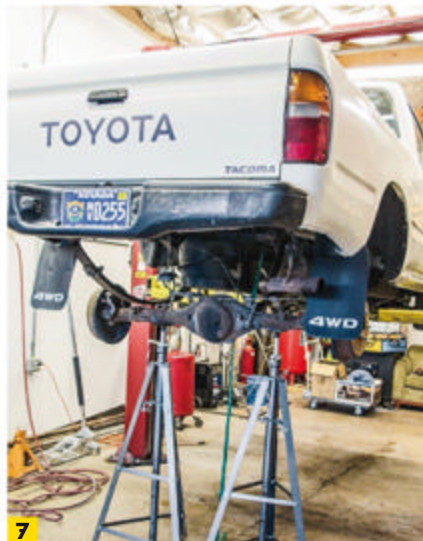
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4



7



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SWITCHBACK 738V

17 18 20



BACKCOUNTRY 719BM

18 20



BIG BLOCK 726MB

18 20 22



BIG BLOCK 726C

18 20 22



OVERDRIVE 728B

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DOMINATOR 725MB

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BLACKJACK 718B

16 17 18 20



DOUBLEPUMP 713MB

16 17 18 20



8



9



10

8 Skyjacker offers add-a-leaf kits for the rear of Tacomas, but the company's Softride full replacement springs offer more wheel travel and a better ride. Note that 1995½-1997 Tacomas (like Wyatt's) used shorter leaf springs than 1998-2004 Tacomas. We learned that one the hard way, and leaf springs are not inexpensive to ship.

9 Skyjacker Softride springs use Teflon sliders between the leaves, tapered ends, and bolted (instead of clamped) leaf retainers. All of these features reduce friction for increased articulation and a smoother rider.



11

10 The rear leaf springs are complemented by Skyjacker M95 monotube shocks that are valved specifically for the Tacoma and are longer than stock to match the height and travel of the leaf springs. The M95 shocks use high-pressure nitrogen and a floating piston for fade-free performance—even when subjected to a teenage driver.

11 One sure way to spot a truck that never really goes off-road is that the U-bolts hang down and are unharmed. Flipping the U-bolts so they face upward is the ideal solution, but then new lower shock mounts must be fabricated. Wyatt simply cut the excess off the new Skyjacker U-bolts that were included with the springs.

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12



13

12 Sam Cothrun at Samco Fabrication mounted up our new General Grabber AT2 tires on Toyota TRD rims. The Grabbers are the perfect tires for this truck, as they are more aggressive than stock while providing great traction in a wide variety of environments from sand to pavement to snow.

13 The 235/85R16 General Grabber AT2s are nearly 4 inches taller than the tires that are being replaced, but they are only half



14

an inch wider. The pizza-cutter tires maximize ground clearance while keeping weight and rolling resistant to a minimum.

14 The last step required was an alignment before hitting the road. Then it was back to school for Wyatt. His new Skyjacker suspension and General tires have definitely taught him the value of getting good grades! "Hello Ladies, this bench seat has room for three" 🍷

SOURCES

GENERAL TIRE
800.847.3349
generaltire.com

SAMCO FABRICATION
775.856.4100
samcofabrication.com

SKYJACKER SUSPENSION
318.388.0816
skyjacker.com



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3.5"	Complete Kit w/Upper Arms	\$499.95
5" / 7"	Complete Kit w/N2 Rear Shocks	\$1199.95

2007-2013 1500 PU / SUV 4WD

2"	Front Leveling Strut Spacers	\$64.95
3.5"	Complete Kit w/Upper Arms	\$479.95
4.75"	Combo Kit (3.5" Susp / 1.25" Body)	\$549.95
5"	Complete Kit w/N2 Rear Shocks	\$999.95
6"	Complete Kit w/N2 Rear Shocks	\$999.95
7.5"	Complete Kit w/N2 Rear Shocks	\$999.95

2011-2015 2500 HD PU 4WD

1.5-2"	Front Leveling Torsion Keys	\$159.95
7.5"	Complete Kit w/2.0 Shocks	\$1399.95

DODGE



2009-2015 1500 Ram PU 4WD

2.5"	Front Leveling Kit	\$129.95
3.75"	Combo Kit (2.5" Susp/1.25" Body)*	\$249.95
4"	Complete Kit w/2.2 Rear Shocks	\$1249.95
6"	Complete Kit w/2.2 Rear Shocks	\$1399.95

2014 2500 Ram PU 4WD

2.5"	Front Leveling Coil Spacers	\$99.95
5"	Complete Kit w/Radius Arms	\$999.95

2003-2013 2500/3500 Ram PU 4WD

2"	Front Leveling Coils	\$179.95
2.5"	Front Leveling Spacers	\$99.95
5"	Complete Kit w/2.0 Shocks	\$699.95
5"	X-Series Kit w/Adj Arms & Shocks	\$899.95
5"	Long Arm Kit w/2.0 Shocks	\$1299.95

*2009-2012 models ONLY!

FORD



2009-2014 F-150 4WD

2.5"	Front Leveling Strut Extensions	\$99.95
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6"	Complete Kit NEW LOW PRICE!	\$999.95

1997-2003 F-150 4WD

2.5"	Front Leveling Torsion Keys	\$99.95
4/5"	Complete Kit w/2.0 Shocks	\$999.95

2005-2015 F-250 Super Duty 4WD

1.5"	Front Leveling Coil Springs	\$159.95
2"	Front Leveling Coil Spacers	\$99.95
3"	Complete Kit w/Front Spacers	\$379.95
3"	Series II Kit w/Coil springs	\$499.95
4.5"	Complete Kit w/2.0 Shocks	\$649.95
6"	Radius Arm Drop Kit w/Shocks	\$799.95
6"	4-Link Radius Arm Kit w/Shocks	\$1299.95

JEEP JK



2.5"	Coil Spacer Kit	\$139.95
2.5"	Coils w/shock relocation	\$249.95
2.5"	Coils w/Perf. 2.2 shocks	\$349.95 - \$329.95
3.25"	Coils w/Perf. 2.2 shocks	\$399.95
3.5"	Complete Kit w/N2.0	\$499.95
3.75"	2.5" susp. / 1.25" body	\$449.95 - \$419.95
4"	Complete Kit w/shocks	\$575.95 - \$499.95
4"	X-series Kit	\$1249.95 - \$1199.95
6"	X-series Kit	\$1339.95
4"/6"	07-14 Long Arm Upgrade*	\$1199.95
4"	07-14 Long Arm Susp.*	\$1999.95
6"	07-14 Long Arm Susp.*	\$2099.95

JEEP TJ



0.75"	Leveling Spacers	\$39.95
1.5"	Coil Spacer Kit	\$199.95
2"	Coil Spacer Kit	\$429.95 - \$109.95
2.5"	X-series Kit w/X-Flex arms	\$949.95
3.25"	Coils w/2.2 shocks	\$399.95 - \$369.95
3.75"	2" susp. / 1.25" body	\$429.95 - \$389.95
4"	Complete Kit w/N2.0	\$549.95 - \$499.95
4"	X-series Kit w/X-Flex arms	\$999.95
6"	X-series Kit w/X-Flex arms	\$1049.95
2.5"	Long Arm Suspension	\$1499.95
4"	Long Arm Suspension	\$1599.95
6"	Long Arm Suspension	\$1649.95

JEEP XJ



1.5"	Coil Spacer Kit	\$249.95
3"	Coils w/ N2.0 Shocks	\$255.95
3"	Series II Kit w/N2.0 Shocks	\$345.95
4.5"	Complete Kit w/N2.0	\$499.95 - \$459.95
4.5"	X-series Kit w/X-Flex arms-N2.0*	\$829.95
6.5"	X-series Kit w/X-Flex arms-N2.0*	\$899.95
4.5"	Long Arm Suspension	\$1299.95
4.5"	Long Arm Suspension*	\$1399.95
6.5"	Long Arm Suspension*	\$1449.95

*Includes new rear leaf springs

*2012-2015 models add \$190 to long arm kit cost

JEEP WJ/ZJ



1999-2004 WJ Grand Cherokee

2"	Coil Spacer Kit w/N2.0 Shocks	\$249.95
4"	Complete Kit w/Perf 2.2 Shocks	\$649.95
4"	X-series w/X-Flex Arms	\$799.95 - \$749.95
4"	Long Arm Suspension	\$1499.95

1993-1998 ZJ Grand Cherokee

1.5"	Coil Spacer Kit w/Shocks	\$205.95
3.5"	Complete Kit w/N2.0 Shocks	\$399.95
4"	Series II Kit w/arms & Shocks	\$599.95
4"	X-series Kit w/X-Flex arms - N2.0	\$779.95
4"	Long Arm Suspension	\$1499.95

NISSAN



2004-2015 Titan 4WD

2"	Front Leveling Strut Extensions	\$99.95
3"	Front Leveling Kit w/Upper Arms	\$349.95
6"	Complete Kit w/2.0 Rear Shocks	\$1199.95

2005-2014 Frontier / Xterra 4WD

1.5"	Rear Lift Shackles	\$64.95
2.5"	Front Leveling Strut Extensions	\$99.95
2.5"	Complete Kit	\$149.95

1986.5-1997 D21 Hardbody PU 4WD

1.5-2"	Complete Kit w/Upper Arms	\$339.95
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TOYOTA



2007-2015 Tundra 4WD

2.5-3"	Front Leveling Kit	\$129.95
2.5-3"	Leveling Lift Kit w/rear blocks	\$169.95
4.5"	Complete Kit w/2.0 Rear Shocks	\$1249.95
6"	Complete Kit w/2.0 Rear Shocks	\$1299.95

1999-2006 Tundra 4WD

2.5"	Leveling Lift Kit w/rear blocks	\$269.95
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2005-2014 Tacoma 4WD

3"	Leveling Lift Kit w/rear blocks	\$249.95
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2"	01-10 2500/3500 HD PU (4WD)	\$99.95

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2.5"	09-15 Ram 1500 (4WD)	\$129.95
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2.5"	94-14 Ram 2500/3500 (4WD)	\$99.95
2"	05-10 Dakota / Raider (2WD)	\$99.95

FORD MODELS

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2.5"	97-03 F-150 (4WD)	\$99.95
2"	97-03 F-150 (2WD)	\$129.95
1.5"	80-96 F-150 / Bronco (4WD/2WD)	\$129.95
1.5"	05-15 F-250 SD Coil Kit (4WD)	\$159.95
2"	05-15 F-250 SD Spacer Kit (4WD)	\$99.95
2.5"	99-04 F-250/350 SD (4WD)	\$309.95
2.5"	03-13 Expedition (4WD/2WD)	\$169.95
1.5"	83-97 Ranger/Bronco II (4WD/2WD)	\$129.95

HUMMER MODELS

2.5"	05-10 Hummer H3 (4WD)	\$99.95
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TOYOTA MODELS

2.5-3"	07-15 Tundra (4WD)	\$129.95
2.5-3"	07-15 Tundra (2WD)	\$99.95
2.5"	99-06 Tundra (4WD)	\$269.95
3"	05-14 Tacoma (4WD)	\$249.95
2.5"	95-04 Tacoma (4WD)	\$239.95

NISSAN MODELS

2"	04-15 Titan (4WD/2WD)	\$99.95
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PART 2: BUILDING A CUSTOM LINKED SUSPENSION

ON TRACK

By Harry Wagner
PHOTOGRAPHY HARRY WAGNER

WE KNEW FROM THE start that we were going to ditch the independent front suspension on our Tracker project for a custom linked suspension front and rear. While that decision was easy, determining exactly what would fit and meet our needs for extreme rockcrawling while remaining street legal was a bigger challenge. And as with many projects, we fell a little behind schedule. This month we will talk about the theory behind the suspension configuration and components we chose, and next month

we will go into more detail on how the final product was install on the Tracker.

FRONT SUSPENSION

Front solid-axle link suspensions can consist of a three-link, a four-link, or radius arms, which in that order decrease from more to less articulation. All of these suspension designs utilize a track bar (Panhard bar) to locate the axle laterally. The bar should be parallel to the drag link in order to minimize bumpsteer. A triangulated front suspension would require full hydraulic steering or a complicated bell crank steering system to avoid massive bumpsteer as the suspension articulates. Neither steering system was considered practical for our lightweight, street-legal Tracker.

Radius arms and four-link suspensions

have been used on the front of everything from Early Broncos to JK Wranglers. They provide good stability and are consistent from side to side (react the same regardless of whether the driver side or the passenger side is compressing). They also tend to bind during articulation, which can be useful since it acts as roll resistance (the same effect as a sway bar), but binding limits articulation.

We chose a three-link front suspension for our Tracker with two lower links to position the axle, one upper link to prevent the axle from rotating, and a track bar to locate the axle laterally. The distance between the upper and lower links must be great enough to prevent the axle from rotating when power is applied, but an overly tall upper link mount will limit uptravel before



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ON TRACK



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contacting the frame and can swing into the frame or oil pan under articulation depending on location. With only one upper link, binding is greatly reduced when compared to a four-link suspension, but it must be built strong enough to control axle twist, and we anticipate adding a sway bar to add stability on the street. The track bar will be positioned parallel to the steering drag link to minimize bumpsteer and ideally flat at ride height for an improved roll center.

REAR SUSPENSION

The rear suspension does not have to share space with steering components

or concerns about tire clearance at full lock, simplifying the process. Common rear suspensions consist of four links with a track bar, such as is found on the rear of JK Wranglers, and three links or triangulated four links that eliminate the requirement of a track bar. Like the front suspension, using a four-link with a track bar allows for abundant vertical wheel travel but can cause binding when the suspension articulates. This is why many Jeep owners convert to a triangulated rear suspension, whereas you do not have the bumpsteer issues that prevent this suspension configuration from typically being used on the front of 4x4s.



6



7

1 On the front of the Tracker, the new Diamond axle needed to be positioned far enough forward to clear the sump on the oil pan at full compression. While this had the added benefit of stretching the wheelbase and improving the approach angle, it made packaging the track bar and drag link more challenging.

2 Haines built a crossmember out of 1 3/4x0.156-wall tubing to mount the front suspension links. Since the crossmember is under the transmission, tube clamps from Trail-Gear were added to service the drivetrain.

3 Jesse Haines measured the centerline of the axle to make certain that it was centered under the chassis. Mounting the lower links to the axle means finding a balance between fitment on the axlehousing and a separation wide enough for stability yet compact enough to allow the tire to turn to full lock without contacting the link.

4 Rod End Supply makes rod ends in a number of sizes and materials for everything from carburetor linkages to Trophy Truck suspensions. We chose chromoly steel XM rod ends that are self-lubricating with a Nylafiber matrix race. While they more economical rod ends, Rod End Supply's Bob Douglas stated that XM rod ends are a great long-term value since they stay tight for so much longer than conventional rod ends.

5 Misalignment spacers allow more angularity out of a rod end at the expense of the hardware size. We will be using misalignment spacers from Rod End Supply on our drag link, but suspension links will not require them due to the orientation of the rod ends.

6 Weld washers don't offer as much angularity as misalignment spacers, but they also do not require a smaller fastener to be used. Haines recommended running weld washers on all the control arm brackets to add a small degree of angularity. The larger benefit though is the ability to build thinner, and thus lighter, brackets without concern of the holes becoming egg-shaped after hard use off-road.

7 Misalignment spacers, jam nuts, and weld-in bungs are all available from Rod End Supply. If you know the length of control arms you need, you can even purchase completely welded links in DOM or chromoly from Rod End Supply.

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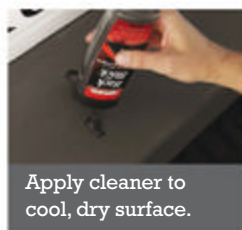


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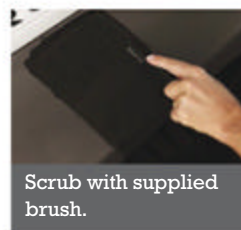
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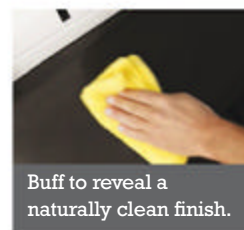
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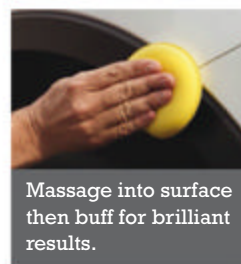


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13


8 Mounting the lower links on the centerline of the axletube maximizes ground clearance and also minimizes the angle of the links at ride height. Haines made the links 32 inches long, long enough to provide plenty of articulation and minimize angle change as the suspension cycles but still be short enough that they do not hang down excessively and impede progress when the front tire rolls over a boulder.

9 An FJ60 steering box was sourced from Trail-Gear. This Toyota box is much more robust than anything Suzuki ever offered, and unlike a more common Toyota pickup steering box, the pitman arm faces forward on the FJ60 box. This positions the drag link forward for increased clearance with the suspension components.

10 The front suspension on Haines' previous flatfender buggy used a triangulated four-link with a traditional steering box to conform with rules for the class it was raced in. The steering box was mounted on the firewall and used a bellcrank system. This maximized articulation and minimized bumpsteer, but it was heavier and more complex than we wanted on our Tracker.

11 Haines' rockcrawling buggy uses an offset rear differential and a three-link rear suspension with a track bar. We plan to mimic this setup on our Tracker. Note how much longer the track bar bracket is than a typical Jeep suspension. This increases the roll center of the vehicle, providing stability in off-camber situations.

12 Another popular rear suspension option is a triangulated four-link. By triangulating the upper suspension links, they not only prevent the axle from rotating but also locate it from side to side. The only reason we chose not to run this form of suspension on our Tracker was for packaging concerns with the low ride height of the vehicle.

13 Weight is an important factor for this project. The 2½-inch-diameter, 12-inch-travel ADS air shocks we used only weigh 14 pounds each. Comparable coilovers would weigh over 20 pounds at each corner. Some of that weight savings will be offset by the addition of a sway bar, since air shocks offer very little roll resistance. 

SOURCES

ADS SHOCKS
520.748.0005
adsshocks.com

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DOIN' IT RIGHT

ALL LIFTS ARE NOT CREATED EQUAL

By Harry Wagner

PHOTOGRAPHY HARRY WAGNER

PLENTY OF PEOPLE WANT THE look of a lifted truck but don't spend a lot of time in low range. Strut spacers (commonly called a leveling kit) are a great way to fit bigger, more aggressive tires at an affordable price and retain the factory ride

characteristics, since the stock coil springs are retained. They have their drawbacks when subjected to hard trail use, such as this Toyota Tundra encounters on a routine basis as part of Colorado's Stay the Trail program (see sidebar below).

Strut spacers mount on top of the factory strut, so when the strut is in the neutral position, the steering, control arms, and CVs are not in the neutral position. In the middle of suspension travel, where most trucks live when used on the street and dirt roads, this is not a problem. If you use all of the suspension travel though, CV binding and even breakage can occur, since the CV axle essentially becomes the

limiting factor to suspension extension (droop). Old Man Emu (OME) has a suspension that addresses all of these issues.

We headed to Toyota specialist Slee Off-Road, where technicians Joe Risavi and Nick Briscoe were able to complete the installation in a day. They taught us some tricks about Toyotas in the process. The Old Man Emu suspension provides just 2 inches of lift height so it doesn't require new knuckles or crossmembers, just quality struts and springs. While the cost is higher than a leveling kit, the OME suspension offers more wheel travel and a better ride than the strut spacers both on the street and the trail. That is important for trucks like this that get used hard.



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“Old Man Emu has a suspension that addresses all of these issues”

1 The Tundra came to Slee Off Road with a spacer lift installed above the factory strut. This adds ride height at a low cost, but the travel of the coilover strut is out of phase with the CV and control arms.

2 Note how the overall length of the factory strut and spacer is the same as the new Old Man Emu strut. This accounts for the 2-inch lift over factory height. The OME strut uses a longer coil though, which provides additional wheel travel without any binding.

3 Unlike most suspension manufacturers, Old Man Emu offers multiple lengths and spring rates for most of its suspension systems. The company understands that not every truck is loaded or used the same way. Those with heavy bumpers and front winches will benefit from longer and firmer coils, while those with a lighter truck will achieve the best results with a lower spring rate.

4 Since different coil rates are available, the coils do not come installed on the Old Man Emu struts. A coil spring compressor is necessary to install the new coils. If you are doing the installation at home, you can typically rent one of these tools from your local auto parts store.

5 The only component that gets reused on the front suspension is the factory “top hat.” Joe Risavi of Slee Off-Road explained that if you live in the Rust Belt, the stock parts might require replacement due to excessive corrosion, but they are available new from Toyota. Note the “out” that should be used to orient the top hat upon reinstallation.

6 Even at full droop, the CV does not bind with the new Old Man Emu suspension. You never want items like brake lines or CV joints to be the limiting factor for suspension travel.

7 The spacer lowers the entire strut assembly, so by the time the strut is full extended the upper control arm makes contact with the coil spring and the CV binds. The Old Man Emu suspension is engineered to prevent these issues.

8 The factory upper control arms were retained on this Tundra, but Slee Off Road recommends installing Specialty Products upper control arms if your budget allows. The Specialty Products arms allow you to adjust the caster and retain factory ball joints for long life and reliability.



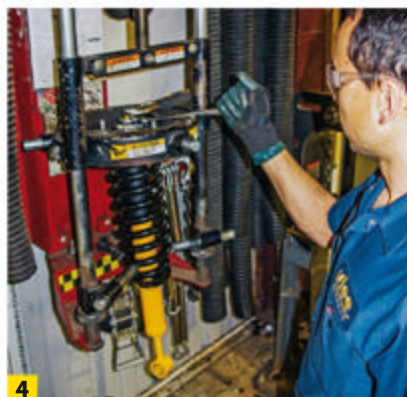
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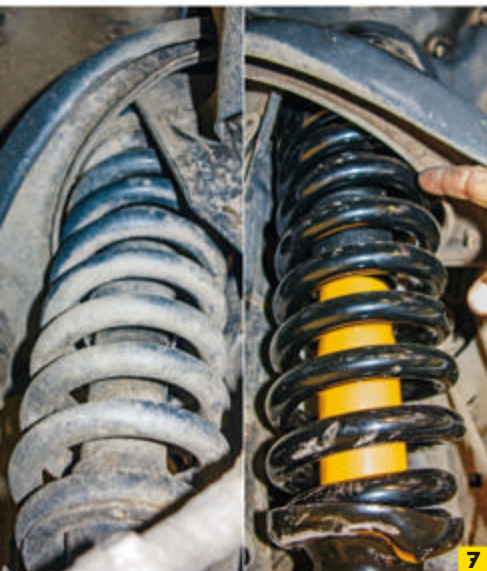
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9 The rear of the Tundra uses leaf springs, but although they are lower technology than coilover struts they are not all created equal. Note how the new OME springs have more leaves than the factory springs, but each leaf is thinner and tapered at the end of for a smooth ride. They also used bolted clamps, which allow more wheel travel than the factory spring clamps.

10 Whenever you're changing leaf springs, it is important to install new U-bolts. U-bolts stretch when they are torqued, and that stretch helps to keep them tight, similar to an engine head bolt. The Old Man Emu suspension comes with new U-bolts.

11 Old Man Emu makes longer shackles to take advantage of the travel added by the company's leaf springs. The shackles use fluted bushings and hardware fitted with grease zerks to allow them to be greased. The grease keeps the shackles moving smoothly and free of noise.

12 The Old Man Emu Nitrocharger shocks use low-pressure nitrogen and multi-stage valving, which eliminates oil starvation at high speed and greatly reduces heat and pressure buildup. Note the metal shock boot to protect the hard chrome shock shaft.

13 Joe Risavi uses a paint pen on all suspension hardware. This is a race car trick that is useful on your daily driver as well since it makes it easy to tell if any hardware has loosened with a quick glance.

14 Old Man Emu includes details in its suspension systems that some other manufacturers deem optional. One example is this brake line extension, which is easy to install and ensures that the rear brake lines do not over extend at full droop.

15 The Tundra was fit with 285/75R18 Nitto Terra Grappler G2 tires from Discount Tire on factory rims when it came into Slee Off-Road. The same size tires were used with the new OME suspension. These tires are a more aggressive than the stock tires without any compromises on the pavement.

16 The final step with any new suspension is an alignment. Slee has a state-of-the-art Hunter 4-wheel alignment machine in house so they don't have to worry about the local tire store sending them home because it cannot align a lifted vehicle with big tires. 🚗

SOURCES

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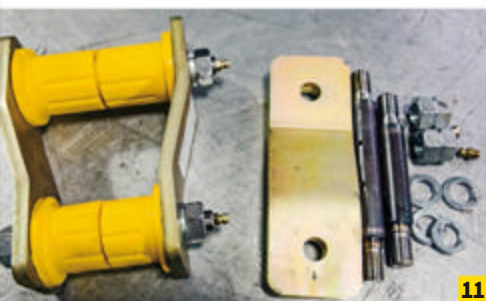
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MINI TRUCK WITH STRONG BONES

BY Jay Kopycinski

PHOTOGRAPHY JAY KOPYCINSKI

WHEN YOU RUN TRAILS for a long time, you come to a better comprehension of the exact vehicle you'd like to tackle your favorite terrain with. Symon DeVries cut his teeth wheeling the forests in the state of Washington 25 years ago, but now calls the desert and mountain trails of Arizona his stomping grounds. Over the years he has refined

the Toyota truck you see here to help him negotiate the kinds of rock trails he enjoys.

What he has ended up with is a slightly stretched 1985 Toyota pickup with an Xtra Cab sitting on a modified standard-cab frame. He wanted to achieve a 105-inch wheelbase, a length that settles right in the sweet spot for Southwestern rock wheeling. The extended cab gives him comfortable inside space, and he has a shortened bed still capable of supporting a 37-inch spare tire, spare parts, and tools, plus room to carry weekend camping items.

The factory drivetrain is no longer intact. Now, a Chevy 6.0L V-8 feeds a 700R4 four-speed automatic and GM 203/ Dana 300 combination transfer case. The resulting setup provides speed, torque, and go-slow gearing to a pair of fully built Dana 60 axles. Wrap it all together with linked suspensions front and rear and you've got a highly capable wheeling rig. Possibly the perfect Toylet?

1 The factory front fenders are gone and tube-structure fenders built in their place, which were then covered with race-car plastic sheeting. The custom dove-nose was completed with an FJ Cruiser grille flanked by Halogen and HID lighting. Symon built a custom front bumper to support a Warn M8000 winch spooled with Amsteel Blue rope threaded through a Beyond Insanity aluminum fairlead. Rolling rubber consists of 37x12.50R17LT Pitbull Rocker Radials locked onto 17x9 Robbie Gordon beadlocks with a six-lug pattern.

2 Symon swapped an Xtra Cab cab onto a standard pickup frame to buy himself greater cab space without an excessive wheelbase for his needs. When the weather is nice, the factory doors come off the truck and a set of tube doors sits in their place. Inside are racing suspension seats with Simpson five-point harnesses to provide comfort and safety. A full complement of Auto Meter gauges displays engine vital signs, along with speed and engine rpm.

3 Custom steel work is laced throughout this Toyota, including both bumpers and a frame-connected bed cage built from 1½x1½-wall DOM tubing. Rock sliders use the same type tubing, but in ¼-inch wall thickness.



UNCOMMON



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4 The factory bed has morphed into a custom dove-tailed structure fabricated mostly from tubing, then also covered in plastic race-car sheeting. The bed holds another 37-inch tire as a spare, and a custom toolbox under the tire carries tools and spare parts on the trail. The dual Optima batteries also reside in the bed to improve weight distribution, and a bed-mounted CO₂ tank is available for inflation needs. Since the truck is also driven on the street, Symon fabricated a pair of custom rear quick-release fenders/mud flaps to keep the law off his tail. While on the trail, they pin in place around the spare tire as shown here.



5

TECH SPECS

1985 TOYOTA SHORTBED PU

>DRIVETRAIN

ENGINE: 2003 GM 6.0L V-8

TRANSMISSION: GM 700R4

TRANSFER CASE: GM NP203 crawl box, Jeep Dana 300

FRONT AXLE: Narrowed Dodge Dana 60, 5.38 gears, Detroit Locker, Yukon shafts, Longfield Super Joints, Yukon hubs

REAR AXLE: Currie Rock Jock Dana 60, 5.38 gears, Detroit Locker, 35-spline shafts, disc brakes

>SUSPENSION

SPRINGS & SUCH: Custom 3-link, Jeep TJ Rubicon Express lift coils, Fox 4-inch bumpstops, Rancho 9000 shocks (front); homebrew double-triangulated 4-link, Jeep TJ Rubicon Express lift coils, Rancho 9000 shocks (rear)

TIRES & WHEELS: 37x12.50R17LT Pitbull Rocker Radials mounted on 17x9 Robbie Gordon beadlocks

STEERING: Saginaw steering box with PSC hydro-assist

OTHER STUFF: Xtra Cab swap, dove-nosed front and tail with tubular fender structures, custom bumpers and cage work, tube doors, hidden spares storage, Warn M8000 winch, rock lights



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5 Popping the modified hood reveals why the bonnet has been modified to bump up in the middle of the sheetmetal. Underneath lies a 2003 Chevy LS4 6.0L V-8. Owner Symon DeVreis swapped it in using a Jim's Performance computer and harness converted to drive-by-cable. The stock V-8 expels hot gases through LS7 exhaust manifolds, which feed a single 3-inch Flowmaster muffler. Cooling upgrades include a Ron Davis two-row aluminum radiator and a pair of Spal electric fans. The transmission is a GM 700R4 with a lockup converter that feeds a GM NP203 crawl box and a twin-stick-equipped Jeep Dana 300 transfer case.

6 The closed-knuckle Toyota front axle is long gone. In its place sits a built axle using a Bent Metal Customs narrowed Dodge Dana 60 kingpin housing. The sturdy hardware stuffed inside includes a Detroit Locker spinning Yukon 5.38 gears, Yukon 35-spline chromoly shafts, Longfield Super Joints, and Yukon Hardcore locking hubs. A Saginaw power steering box now pushes a DOM draglink and tie rod, both using 3/4-inch rod ends. PSC hydro-assist keeps Symon from building Pop-eye arms after a long day on the trail.

7 Not wanting to deal with the spring wrap and clearance issues associated with

front leaf springs, Symon fabricated a custom front three-link suspension. The lower links are constructed from 2x3/4-wall DOM tubing, while the upper links are made from 1 1/2x1/4-wall. Currie Johnny Joints provide flex and rotation at the link ends. Symon found that 4 1/2-inch Jeep TJ lift coils from Rubicon Express gave him the height and spring rate he wanted. Lastly, Fox 4-inch nitrogen bumps provide the cushion over the last inches of compression travel.

8 In the rear is a matching Dana 60 chunk. This one is a Bent Metal Customs/Currie iron RockJock housing terminated with GM 14-bolt spindles supporting Solid Axle six-lug hubs. Like the front, there's a Detroit Locker and Yukon 5.38 gears. The full-float axle uses Dutchman 35-spline chromoly shafts to get the torque to the wheels. The gas tank tucked under the tail of the truck is the stock Toyota pickup fuel-injected tank, but now uses a GM in-tank pump.

9 Symon also fabricated a double-triangulated four-link in the rear using similar link components as he did in the front. Again, 4 1/2-inch Jeep TJ lift coils from Rubicon Express were used here. Rancho 9000 shocks with 14 inches of travel provide the damping on all four corners of the coil-sprung truck, and each corner runs a 1/2-ton GM truck brake caliper and rotor combo.

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BY Jay Kopycinski

PHOTOGRAPHY JAY KOPYCINSKI

WE ACQUIRED A 2006 Jeep Wrangler Rubicon Unlimited, known as an LJ. It was bone stock and in need of suspension upgrades. We considered a variety of lift kits on the market in the 3- to 4-inch range and ultimately chose to go with an offering from Rubicon Express.

We opted for the company's Extreme-Duty Long Arm System. Rubicon Express offers the comprehensive kit for the LJ and TJ models in lift heights from 3½ to 5½ inches. Since we were targeting to

run 33-inch tires on our Jeep, we went with the shortest of the kits. However, an advantage to this system is that it can be upgraded in the future to a taller lift easily should tire and wheeling desires grow.

What's the advantage of a long arm kit? Well, quite simply, suspension geometry, handling, and articulation are improved. The short factory suspension arms work well on a Wrangler at stock heights or for very short lifts. But as lift height increases, so do the resting angles of the links, and this starts to diminish the handling stability and traction capabilities of the suspension.

While this lift can be installed by most competent home mechanics, it does require some skills in cutting to remove factory frame brackets and welding to

secure some of the new hardware. In our case, we let the technicians at our local 4Wheel Parts store in Phoenix, Arizona, tackle the job and we documented the process to show you what's involved.

While we were there we also had the crew mount us a set of 33x12.50R15LT Mickey Thompson Baja ATZ-P3 tires onto ATX Wheels SLOT rims in an 8-inch width. These tires offer what might be termed an aggressive all-terrain tread, along with sidewall side-biters for additional traction. 4Wheel Parts mounted the spun-balanced tires on the Jeep and then put it on the alignment rack for final tuning of all the suspension links and steering. In two days we were ready to hit the highway and head for the dirt.

RUBICON EXPRESS HEIGHTENS A JEEP LJ

LIFTING THE LONG JEEP





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1 Here's the overall parts pile used to complete the Rubicon Express Long Arm System. You can see the large metal plate structures that form the transfer case skidplate and link mounts. It's a complete suspension replacement that includes all new links and track bars.

2 With the stock Wrangler on the lift, 4Wheel Parts service manager Brett Corder got started with the teardown. The kit can be installed as a driveway project, but working on a hydraulic lift with a variety of tall screw jacks that can be used under the axles is immensely faster.

3 The factory Jeep skidplates and crossmembers were removed and the drivetrain supported with a jack. These components are replaced with the new Rubicon Express assembly.

4 The stock monster muffler won't clear the rear links, so it was removed and a new cat-back exhaust will be fabricated after the lift install.

5 Here you can see that Corder has temporarily assembled the 1/4-inch-thick steel three-piece crossmember. This is the main structure of the new lift kit and includes link mounts for all the new links.

6 The new crossmember not only serves as a skidplate and link mount point but also supports the transfer case and structurally ties both framersails solidly together. Several fitting iterations are needed to mark and drill new mounting holes as well as to get the crossmember lined up for final assembly.

7 The crossmember bolts to the frame using the six factory threaded holes on the bottom of the frame. Then it's also secured with a pair of frame side plates and additional bolts that run through sleeves installed in the framersails.

8 One-inch holes are drilled to insert the frame sleeves for the crossmember. While it's not required to weld the sleeves to the outside edge of the frame, Rubicon Express does recommend it. Corder burned ours into the frame for solid mount points.

9 Here is the final assembly of the new crossmember. With all the 1/4-inch steel wrapping around the frame, it makes a sturdy structure. Once installed, the flat center piece can be removed independently for drivetrain access and maintenance.



10 The kit provides stainless steel braided brake lines to accommodate the lift. Corder prefers to replace the lines at this point in the install. If brake fluid drips on painted parts it can remove the paint. Care is taken not to let any drip, but Corder would rather have it eat paint on the old parts than the new parts.

11 Coils, shocks, and lower links were then removed from the axles, leaving the upper links intact to hold the axles in place. Corder suggested, in general, leaving as many parts in place as long as you can to keep the axle positions more stable and make the overall install easier.

12 With the belly pan fully installed, it was time to pull out the heat wrench and torch the factory lower link mounts off the frame. Once Corder did the torch work, he stripped the leftover slag line off with an air chisel and then smoothed the frametrails with a grinder. A coat of paint hid the evidence that the brackets were ever there. No turning back.



13 The new links went on next, but not before setting their length based on the instructions and lift height chosen. All the joints got new zerk fittings and a few shots of grease. It's a good idea to index the fittings at this time so they can be accessed with a gun later after mounting. The lower control arms are beefy 2x0.25-wall chromoly tubing. Nice.

14 The kit includes a bracket to raise the track bar mounting at the rear axle. It's secured at three different points with bolts.

15 The factory rear shock mounts needed to be cut off and Rubicon Express provided new mounts that were welded to the axletubes.

16 Here's the completed rear suspension with the new upper and lower links. The new coil springs and shocks were installed, as were extended sway bar links for the factory sway bar. Our Rubicon model came from the factory with a standard flange output at the



transfer case and a CV-joint driveshaft. Otherwise, conversion to a rear slip-yoke eliminator and new driveshaft would have been needed.

17 The front end was completed with the new radius-arm lower links, coils, and shocks. The kit comes with extended links for the factory sway bar with quick-disconnect pins to disable the sway bar action on the trail.

18 The frame hole for the front track bar had to be enlarged for the new heavy-duty bar with rod end. Both front and rear track bars were adjusted and fully connected once the Jeep was back on the ground sitting at ride height.

19 With the lift on, it was time to swap to larger treads. We opted for a set of 33x12.50R15LT Mickey Thompson Baja ATZ-P3 tires. These are described as a hybrid design between an all-terrain and a mud-terrain. Sure, the latest rage is taller and taller wheels but we prefer the philosophy of running a rim no



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taller than half the height of the tires. We could have run a 16-inch wheel, but 15s fit over our calipers and allow us a little more sidewall and the choice of using Load Range C tires.

20 For wheels, we chose the ATX Wheels SLOT in an 8-inch width. The wheels are finished in a satin black with a machined edge. Backspacing is 3¾ inches. You can see the aggressive sidewall on the Mickey Thompsons here. The crew at 4Wheel Parts mounted and spun balanced our new tires, and finished the lift with a full alignment procedure. 🚗

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ATX WHEELS
atxwheels.com

4WHEEL PARTS
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STRONGEST LINK

ANATOMY OF A SUSPENSION LINK



BY Fred Williams

PHOTOGRAPHY FRED WILLIAMS

SOME OF YOU RECALL WHEN suspension links swept the off-road scene. For the longest time leaf springs were king, and then all of a sudden the link suspension technology seemed to pop up everywhere.

Before you knew it, leaf springs were old news and you had to have a link suspension to even consider going off-road. OK, that's not true. You can go wheeling with leaf springs—in fact, leaf springs work quite well—but a link suspension has such a high-tech look and offers such a great ability to fine-tune your suspension performance that it really is a step above most leaf suspensions.

Nowadays link suspensions are old news. Lots of garage built wheelers have them, and the art of suspension geometry has really grown and been fine-tuned by many. This isn't a tech piece about that geometry, but rather the hardware. This is just about the parts to make a good link. What type of material do you want to use? What's the difference between Heim, flex, and Johnny joints? What's the best way to assemble everything? Thankfully there is nothing set in stone here—there are lots of right ways to do stuff and a few wrong ways to steer clear of, but that should allow you to develop your own best solution.

1 There are many styles of links in a linked suspension, but for this article we'll concentrate on the basic four-link with two lowers and two uppers, and the three-link with two lowers and one upper. Sometimes the two uppers are triangulated; other times the links are all parallel and a track bar is added to control the lateral movement of the axle. The lower links on a 4x4 need to be the strongest links since they will see the most abuse when smashed into and drug over rock obstacles. Lower links see three forces: the compression and the tension of the axle trying to rotate and a bending force should they land on or hit a trail obstacle. Upper links usually only see compression and tension forces as they keep the axle from rotating. For this reason, upper links can be made of thinner material than lower links, but we would recommend not going thinner than wall tubing of 0.120 inch ($\frac{1}{8}$ inch) on the uppers. Lower links are often found in 2x0.25-wall ($\frac{1}{4}$ inch) and maybe thicker wall if the rig is heavier and abused on rocks.

2 Factory suspension links are pretty basic and boring: a tube link with no adjustment, and a big pressed bushing in the ends. These are great for a road-going 4x4 and work OK for off-road flexing, but as we lift or modify our vehicles these single length links can be too short, or too weak for bashing into rocks.

3 Most suspension links are made out of steel tubing, and for this we recommend DOM steel tubing, usually round tubing, but we have seen some square tube links. DOM (drawn over mandrel) steel tubing is a forming method that works the material and makes it stronger than standard non-DOM welded seam steel tubing. Remember that your lower links will see the most abuse while your upper links are less likely to get rock rash, so they can be lighter.

4 Wide Open Design (WOD) offers massive solid 7075-T6 aluminum suspension links made to order in size from 1½ to 2½ inches in diameter. These are touted as a memory material because they want to spring back into a straight line should they hit an obstacle. When coupled with 1¼-inch shank FK rod ends, these are some very strong suspension links. WOD starts with the solid stock and then cuts them to length and drills and taps the ends for your chosen rod-end shank thread size.

5 One of the best options for suspension links is heat-treated chromoly because it is very resilient to bending and much tougher against abuse than untreated chromoly or mild steel. Links that are heat-treated start as chromoly tubing and are either threaded or have chromoly bungs welded in the ends before being sent to a special facility where they are hardened. Not many companies offer heat-treated suspension links, but Shaffer's Offroad will make them for you (expect the price to be higher than a standard mild steel link).

6 The threads in the ends of the suspension links are either cut right into the tube or come in a bung that is welded into the link end. When welding in the bungs, take care that you don't get the bung so hot that you distort the threads inside. Threading the tube itself can require a very large tap and is better done on a lathe. If you want either end of the link to be opposite threads, you will either need to buy two taps, or two different bungs (a left hand and a right hand).

7 There are two schools of thought on threads on the ends of a link suspension. Some folks say you want both ends threaded the same way, usually both right-hand thread, as that is the most common (right-hand threads are the same as a normal bolt: righty tighty, lefty loosey). This argument is based on the fact that if your jam nuts should come loose the link will not lengthen or shorten and is effectively locked at a length. However, if you want to adjust the length of the link you need to pull one end from its mount on either the frame or axle.





8

8 When you run a link with left- and right-hand threads you can easily adjust the link length right on the vehicle because it will screw in or out of both ends at the same time. Just loosen the jam nuts and turn the link. However, if the jam nuts should work loose (as can happen when you bash them against rocks) the link can start to walk longer or shorter, and this is bad. It can throw your suspension out of alignment and bind shocks and driveshafts if not caught. The rule of thumb for any direction thread is to keep those jam nuts tight. Note the small groove in the end of the link (arrow). This designates the end as left-hand thread, and most weld-in bungs also have this warning groove cut in them as a reminder for easier use.

9 The flat spot on some links is so you can use a large wrench to turn the link and adjust it on the vehicle. You can also hold the link from turning while tightening down your jam nuts.

10 Another option for ease of link adjustability is a Synergy Double Adjuster Sleeve. This small threaded sleeve goes inside the link, and the rod end screws into it. When the clamping bolts are loosened the length of the entire link can be adjusted by turning just one large threaded adjuster sleeve.

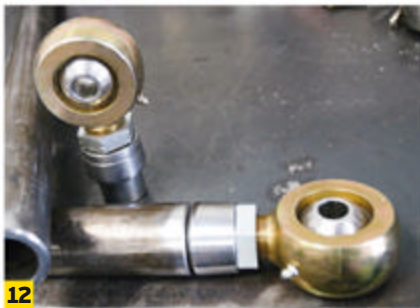
11 Not every suspension link needs a high-dollar Heim or rod end at the mounting ends. These lower links on a truck built by Randy Ellis Design use bushings at the ends for simplicity and because the suspension geometry has been set up such that the axle doesn't need super-flexy joints. You can find plenty of bushing options at Daystar and Energy Suspension. Note how the upper links have a slight bend in them to clear the framerrail at full compression.



10



11



12

12 The flexible joint at the end of your link can come in many different styles and sizes (and prices). Heim joints, or spherical rod ends, are the top tier of joints. We have used many different brands of Heim joints, from FK to QA1 to EMF. The rod ends thread into the end of link. The rod ends are the part of the link that allows the axle to twist and not bind. Most of the time you will want to add high misalignment spacers to the rod ends so that the suspension can twist. Some are designed for abusive environments such as racing but need replaced when many miles of off-road use make them loose.

13 Another common link end is a Johnny joint, or flex joint. There are a lot of different versions of this joint but most involve a polyurethane liner, with an inner ball and a steel outer body. As an added benefit, Johnny joints are rebuildable after years of use. Currie originated this design and still offers a variety of sizes and material grades, from forged to billet machined versions. Many suspension companies offer a similar design in their lift kits, such as BDS Suspension's flex joint.



13



14



15

These types of joints are perfect for a street-driven trail rig that needs some noise damping between the axle and the frame.

14 Jam nuts are just one way of keeping your suspension links tight. Jam nuts are threaded onto the threaded shank of your suspension joint before it is screwed into your link. Once the joint is set to length you spin the jam nut up to the end of the link and jam it tight. This keeps the threads from working loose.

15 It is important that you show as little thread of your rod end shank as possible. At the very least you want the same amount of threads inside the link as the diameter of the rod end shank, but in most cases you want most of the threads inside. This means proper measuring of your links before so you don't need as much adjustment. In a perfect world you'll have just one thread showing and then jam the nut up against the link end with the majority of threads in the link. Ⓢ

SOURCES

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BOMBER KING

WHAT'S IN A KING OF THE HAMMERS WINNING BUGGY?

By Fred Williams
PHOTOGRAPHY RICKY BERRY

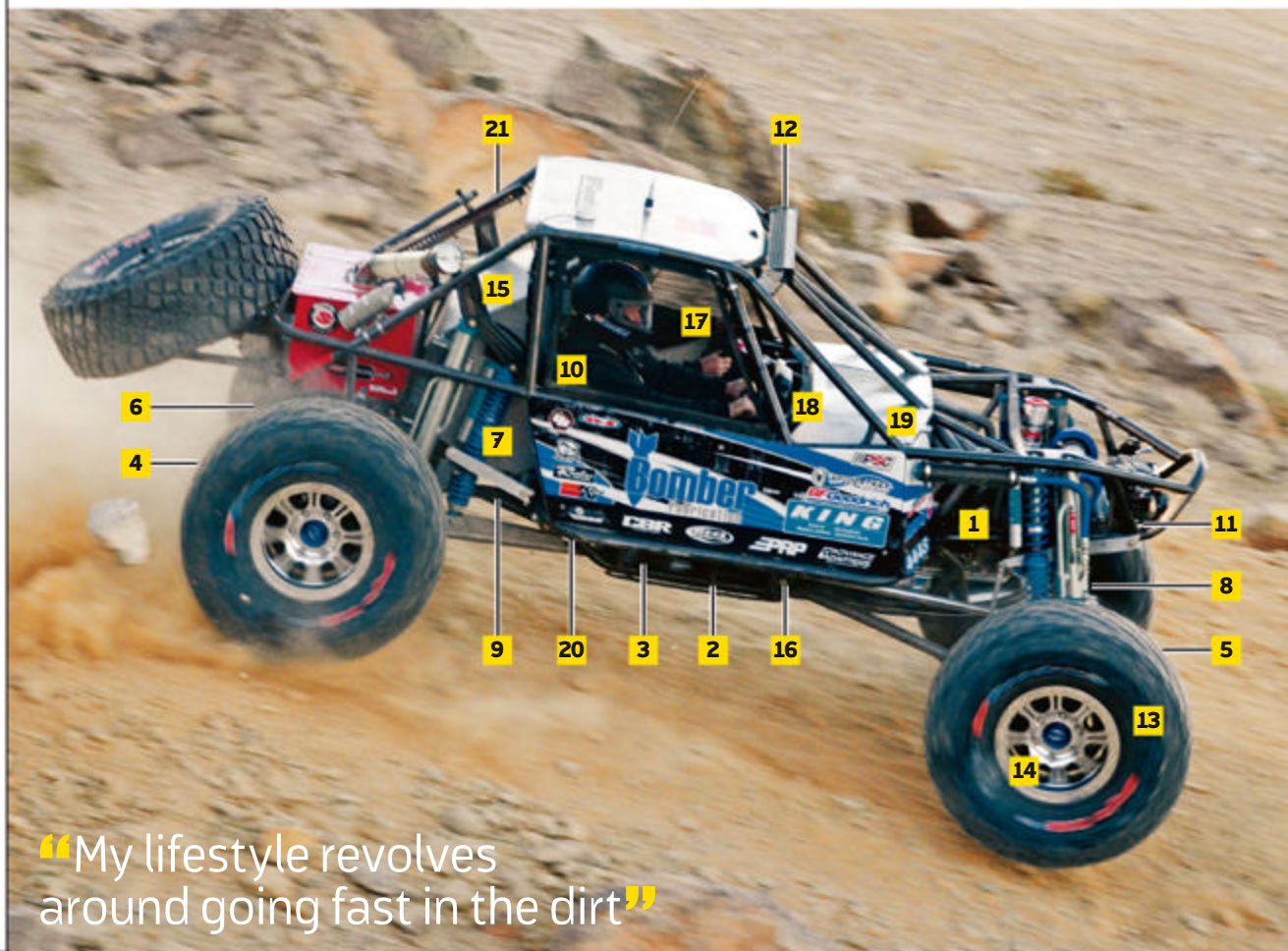
IF YOU HAVEN'T HEARD OF KING of the Hammers (KOH) then you're probably not into rockcrawling or desert racing. KOH is a giant rockcrawling and desert race held every year in Johnson Valley California at the Hammers trails. This year Randy Slawson won the race for the second time, and did so by starting 45th off the line and crossing the finish 215 miles later in just around nine hours, but

ahead of everyone else. And he did it in a buggy he built himself at Bomber Fabrication based in Gardnerville, Nevada. When asked what type of training he does for a 200-plus-mile off-road race he replied, "I just recreate, dirt bikes, side-by-sides, and four-wheel thousands of miles a year. My lifestyle revolves around going fast in the dirt." If you're interested in what is in a winning KOH buggy check out these details. 

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1. Custom Built Motors (CBM) 425ci LS3 engine (est. 600 hp)
2. 4L80E Maximum transmission
3. Atlas II 2.0 transfer case
4. Spidertrax axles
5. Gearworks 10-inch diffs; high 10 front with Gearworks locker
6. 5.43 ring-and-pinion
7. King shocks 3.0 bypass and 2.0 coilovers
8. PSC steering full hydro
9. JeReel Drivelines 13.50 yokes
10. PRP seats
11. Bulldog winch
12. Baja Designs LED lights
13. BFGoodrich 39-inch KR2 tires
14. BTR 17x8 wheels
15. CBR radiators
16. Steinjager Heim joints
17. Sierennet horn/siren
18. PCI radio and intercom
19. K&N air filters
20. Dynomax exhaust
21. Bomber Fabrication chassis



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New Headlock bolts are designed to fasten headers to the engine without the use of lock washers. The design incorporates 24 serrated teeth to maintain consistent fastener clamp-load. Preapplied Thread-Lock Patch compound is self-sealing and also promotes torque-retention. The bolts are made from 300-spec Grade 8 stainless steel. Applications are available for many popular Detroit Three engines. Each kit includes a hex-key socket tool. **INFORMATION:** Mr. Gasket, 216.658.6413, mr-gasket.com.



BDS RAM 8-INCH 4-LINK KITS

For 2013-2014 Ram 2500/3500 4x4s, BDS offers an 8-inch long-arm suspension system. This kit replaces the factory radius arms with a four-link design to improve wheel travel, handling, and control. The link arms are made from 2x $\frac{3}{16}$ -inch DOM tubing and poly bushings. Arm brackets are made from $\frac{1}{4}$ -inch-thick steel; other kit brackets include a track bar relocater and a transmission crossmember driveline-correction piece. The rear is leveled with replacement leaf packs and blocks. Numerous options include Fox 2.0 shocks. **INFORMATION:** BDS Suspension, 517.279.2135, bds-suspension.com.

REPLAY XD PRIME X CAMERA

Replay's newest POV camera uses a mini-prime, $\frac{1}{2}$ -inch-format cinema lens with a 140-degree wide-angle operating at T/2.8, f/2.7. Highest definition is 1080 pixels at 60 frames per second. Still images are a maximum 16 megapixels. The Prime X has a time-lapse feature. The camera's new sensor is designed for 33 percent less power consumption—up to 3 $\frac{1}{2}$ hours on a single charge. Integrated Wi-Fi allows the camera to be remotely controlled on a smartphone using the Replay XD app. A variety of mounts and accessories are available. **INFORMATION:** Replay XD, 805.480.9800, replayxd.com.



OFF-ROAD SOLUTIONS EXTINGUISHER QUICK RELEASE

This NHRA-approved system is designed to flexibly mount 1-, 2 $\frac{1}{2}$ -, and 5-pound extinguishers. The main bracket has chamfered holes for screwing to flat surfaces, or the Quick Release can be secured to round tubing using standard hose clamps or optional billet clamps. Pulling the $\frac{3}{8}$ -inch stainless-steel retaining pin releases the extinguisher from the mounting bracket. Construction is from 6061-T6 billet aluminum. Finish options are bare aluminum or black-anodized. **INFORMATION:** Off-Road Solutions, 901.231.5071, ors4x4.com.



RADIUM FUEL SURGE TANKS

Uneven terrain can slosh fuel away from the fuel pump, causing fuel starvation and a lean condition that can damage an engine. To combat this, Radium Engineering offers a line of bolt-on Fuel Surge Tanks. The OE pump fills and maintains a consistent fuel level in the surge tank, and the tank then forwards pressurized fuel to the fuel rail. Excess fuel is returned to the tank. The tanks install between the fuel tank and fuel rail with no modification to the existing tank or pump. Various model are available to handle different fueling requirements. **INFORMATION:** Radium Engineering, 971.221.6417, radiumauto.com.



ROCK SMASHER 2WAY AIR

This new system uses a centralized manifold that allows simultaneous inflation/deflation of all tires. Setup involves plumbing the vehicle with the kit's $\frac{3}{8}$ - and $\frac{1}{4}$ -inch polyurethane manifold tubing and push-to-connect fittings. Once the tire "whips" are attached, all tires can be inflated or deflated simultaneously through one valve on the central control station. An adjustable pressure set-point valve prevents overinflation. Kits for six-, eight-, and 10-tire vehicles are also available. **INFORMATION:** Rock Smasher Engineering, 702.981.6081, rocksmasher.com.



FEBRUARY SPRING FOLLOW-UP

Q I am writing in regards to two articles in the Feb. '15 issue. In "Old-School Tire Test," the flattie in the article has spring-over in the front and is spring-under in the rear. What springs were used? What was overall diameter of tires tested? Second [third? —ed.], in "Franger or Nord," one of the captions states that the center pin on the springs was moved rearward 2½ inches. Can you drill an second hole in a leaf spring and not lose too much strength? Maybe it's OK if the original hole is supported by the spring pad? Thank you in advance for any information you can provide.

JIM HARSHMAN

via nuts@4wheeloffroad.com

A We always appreciate getting questions from readers that indicate they read the magazine rather than just looking at the pictures, and your questions are good ones. The flattie belongs to Senior Editor Verne Simons and has been through many different builds over the years,

mostly in our sister publication *Jp*. It's one of the coolest flatties out there because it's simple and well thought out, the result of years of refinement. Although Verne has used several different suspension setups in the past, the current version is one of the best. On the front spring-over, Verne uses modified stock YJ rear leaf springs. The spring-under rear of the flattie is supported by heavily modified stock Wagoneer front springs (mounted backwards) with extra leaves from YJ lift springs to get the desired ach. Confused? So are we, but the combination works and is the result of years of trial and error. Verne has had the rear setup as a spring-over with a traction bar in the past, but he could never get axlewrap under control and maintain the flex he wanted. A spring-under configuration places less wrap-inducing leverage on the springs and also puts the axle in the spot where the springs were designed to properly control it. The Coker tires in the test measured right at 36 inches tall.

As for your second question, there's more to the story on the rear springs under



Mike Marrero's Frontier than we could cover in a single caption. I reached out to Marrero for clarification, and he explained that he initially had a set of rear springs built to his specifications by a custom spring manufacturer. The manufacturer got most of it right but missed the location of the centering pin. A second attempt yielded similar results. Under a time crunch, Marrero ended up combining the custom packs with the old off-the-shelf 64-inch GM lift springs he had been using to create the combination that you saw in the article. He reports that it's not ideal (axlewrap remains an issue), but it worked at the time and it's in basically the same configuration to this day. He plans to have a local custom spring shop make him a set of springs that should resolve the issues once and for all. Such is the lot of anyone building something outside the box.

Your concerns regarding redrilling a centering pin in a spring pack are valid. It is not a good idea to redrill a centering pin hole in a leaf pack, especially a main leaf. Stress cracks usually develop at the original hole or the new one, and the leaf eventually ends up snapping in two. I have redrilled main leaves in a pinch, but about half the time I've ended up with a broken spring even when the hole locations were firmly clamped under the U-bolt plates. It's usually better idea to drill another centering pin hole in the axle pad if small wheelbase adjustments are needed.

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Mark, age 47, California



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NUTS & BOLTS

SIDEKICK TIPS

Q I'm looking to purchase a 1990s two-door Suzuki Sidekick for my everyday ride and would like to build it for light to medium trail use. Nothing too crazy since I have a back injury, and these seem to be about the only 4x4 that I can sit in. Are there any years to avoid, or that I should look for? I prefer a manual tranny and few frills.

MIKE

Via nuts@4wheeloffroad.com

A For advice on the best Sidekicks to buy, I turned to our resident Geo Tracker owner (identical to the Sidekick) and frequent contributor, Harry Wagner.

HARRY WAGNER: *I think that the Sidekicks (and their Tracker twins) make great little wheeling rigs that get decent mileage on the street. From 1989 through 1998 they were pretty consistent; the only thing that comes to mind is the use of both 8-valve and 16-valve 1.6L fuel injected engines. The 8V uses throttle body fuel injection, while the 16V has multiport fuel injection (and it should say "16V" on the timing cover). The 8V is rated at 80 hp at 5,400 rpm and 94 lb-ft of torque at 3,000 rpm, while the 16V is rated at 95 hp at 5,600 rpm and 98 lb-ft of torque at 4,000 rpm.*



While the 16V is preferable, I would just try to find the cleanest example with relatively low miles. The one issue with these engines is that they use a timing belt, but they are noninterference engines. If the vehicle has over 100,000 miles on it, ask the seller for evidence that the belt has been changed, or use that as a bargaining tool to lower the price. With 31s and a rear locker I was amazed at where my Tracker would go, although the short wheelbase and automatic locker were a handful on the street (much more so than my Toyota pickup or Ford truck with Detroit).

So there you have it. Sidekicks and Trackers are generally pretty solid, inexpensive vehicles. Beyond checking for all the usual

suspects (oil leaks, tire condition, exterior and interior condition, and so on) it shouldn't be all that hard to find a clean vehicle that is a solid base for a mild vehicle build that can take you just about anywhere. ☺

SUBMISSION INFORMATION

Confused? Email your questions about trucks, 4x4s, and off-roading tech using "Nuts, I'm confused" as the subject and include a picture (if it's applicable). Digital photos must measure no less than 1600 x 1200 pixels (or two megapixels) and be saved as a TIFF, an EPS, or a maximum-quality JPEG file. Also, I'll be checking the forums on our website (4wheeloffroad.com), and if I see a question that I think more of you might want to have answered, I'll print that as well. Otherwise drop it old-school style with the envelope addressed to the address below. Letters published in this magazine reflect the opinions of the writers, and we reserve the right to edit letters for clarity, brevity, or other purposes. **WRITE TO:** Nuts & Bolts, 4-Wheel & Off-Road, 831 S. Douglas St., El Segundo, CA 90245 **FAX TO:** 818.566.8501 **EMAIL TO:** nuts@4wheeloffroad.com

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PINZ ON THE ROCKS

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AARON HAGAR

Rat Runners Garage

Via whoops@4wheeloffroad.com



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Send us your wheeling foul-ups! Letters must be signed by the vehicle's owner. Due to the large volume of mail we receive, we regret that not all submissions can be used and none will be returned. Digital photos must measure at least 1,600 by 1,200 pixels (or two megapixels) and be saved as a TIFF, an EPS, or a maximum-quality JPEG file. **WRITE TO:** Whoops!, 4-Wheel & Off-Road, 831 S. Douglas St., El Segundo, CA 90245 **EMAIL TO:** whoops@4wheeloffroad.com

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